

BRITAIN'S FAVOURITE CIRCUIT (see page 86)

# Amateur Wireless

Every Thursday 3<sup>d</sup>  
And Electrics

Vol. XII. No. 293

Saturday, Jan. 21, 1928

FROM-THE-MAINS "SIMPLER WIRELESS"



# SPECIAL FOUR

**NO BATTERIES :: NO ELIMINATORS**

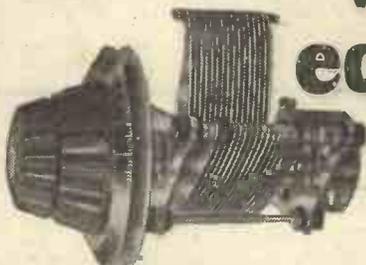
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wireless  
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**Clip CONDENSER AND CLIP.**

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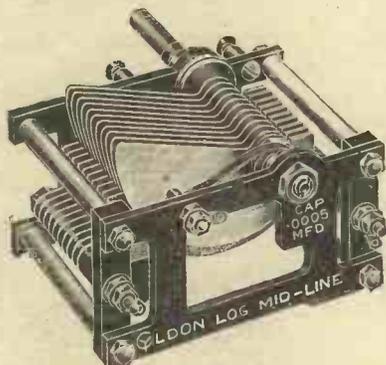


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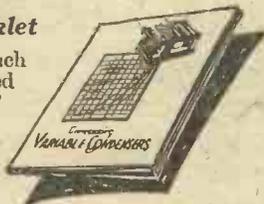


Prices:	With 4 in. knob dial	Prices:
'001 .. .. 19/-	2/- extra. In the case	2 Gang .. £2 10s.
'0005 .. .. 15/6	of gang condensers,	3 Gang .. £3 10s.
'0003 .. .. 14/6	Log Mid-line are a	4 Gang .. £4 10s.
'00025 .. .. 14/-	necessity, not a	
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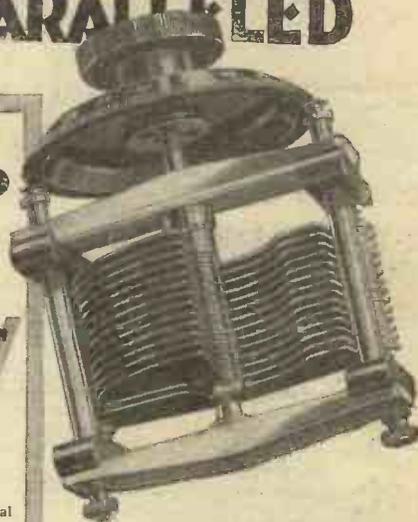
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(No. 5, Road 58,  
Ely, Cardiff,  
28-10-27.)

Messrs. Siemens Brothers & Co. Ltd.,

Dear Sirs,

Your publication of a letter from Mr. R.W. Young, praising one of your 72-volt H.T. Batteries is very interesting, but I have great pleasure in stating that his is not an isolated experience.

I have just discarded one of your batteries of the same type after nineteen months use. During the whole of that period it gave satisfactory service, and for a considerable time it supplied the power to a four valve set with a super-power valve in the last stage.

What seems to me to be especially worthy of mention is the fact that the fall in voltage was gradual, and the internal resistance of each cell was approx. the same at the end of its life.

I know of no battery capable of giving such fine results, and I speak from considerable experience.

You may add my name to your deservedly long list of satisfied customers.

Yours faithfully,  
(Sgd) W.H. Wall.

## SIEMENS WIRELESS BATTERIES

Type R.B.3 (72 Volts) PRICE 24/-

Sizes for other voltages are given in our Catalogue 650

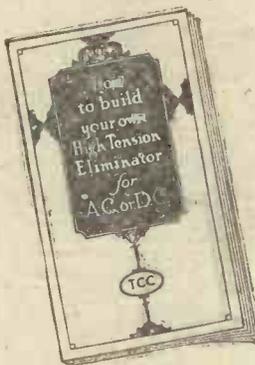
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I enclose 1d. stamp. Please send me your book, "How to build your own H.T. Eliminator for A.C. or D.C." A.W. Jan. 21  
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1415

# Amateur Wireless

## and Electrics

The Leading Radio Weekly for the Constructor, Listener  
and Experimenter

Vol. XII. No. 293

Edited by BERNARD E. JONES  
Technical Editor: J. H. REYNER, B.Sc.(Hons.), A.M.I.E.E.

JANUARY 21, 1928

### A B.B.C. Problem—"Simpler Wireless"—Musician's Paradise—Grand Guignol—PCJJ—New Radio Writer

#### "Simpler Wireless"

MR. J. F. JOHNSTON'S four-valve "Simpler Wireless" receiver needs no introduction. "Simpler Wireless" is now an accepted fact, as any system which really abolishes all batteries and current supply units was bound to become. This receiver is a long-distance loud-speaker set, comprising H.F., detector, and two L.F. It is very stable and the reproduction excellent. Don't forget if you have A.C. mains that you, too, can use the set if you make up the rectifier described in No. 289.

#### The "Economy One"

THE "Economy One" is the third of our three receivers specially designed for cheapness and for efficiency in working. The circuit is "straight" and good. Magnetic reaction is employed. The cost to build is not over 15s.

#### A B.B.C. Problem

THE question of the B.B.C.'s pronunciation is a bone which all the literary "dogs" love to worry. One would have thought that, with a committee consisting of, among others, Mr. Bernard Shaw, Sir J. Forbes-Robertson, and Professor Daniel Jones, and presided over by Dr. Robert Bridges, it would have been safe from much of the criticism that has been made. But it was not so; and perhaps its critics have some justification for arguing that the size of the Oxford English Dictionary should not disqualify it from use at Savoy Hill. If the announcers could not, surely some strong man could be found who could open the volumes!

#### BRITAIN'S FAVOURITE CIRCUIT

"Yes, but what IS Britain's favourite circuit? Your announcement told us who won the competition, but not which circuit really was the favourite"—a reader's question, which we answer below. The Favourite Circuit, as decided by the ballot, has three valves—detector, one resistance-coupled L.F., and one transformer-coupled L.F.



This circuit has now been incorporated in a receiver by our own technical experts, who have spared no pains to make the receiver the ideal embodiment of the circuit.

The aerial is connected to a tapping on the aerial coil, thus ensuring selectivity, while reaction is applied by means of a coil coupled to the aerial coil, and is controlled by a variable reaction condenser. The R.C. unit is so designed that all frequencies are equally amplified. Absolute simplicity of construction has been one of the objects of the designers and expense has been reduced to the minimum, but, as can be seen from the above photograph, the receiver is decidedly handsome.

As a special offer to the constructor, we are also giving a full-size Blueprint of the receiver away with every copy of next week's issue. With this Blueprint, and because of the simplicity of the wiring, etc., even the absolute novice cannot have any doubts to deter him from beginning construction immediately.

We feel sure that all of our readers will do their friends the good turn of telling them about "Britain's Favourite Three"!

G.M.T., the wavelength being 30.2 metres, as before.

#### Grand Guignol!

READERS who may remember the weird Grand Guignol plays presented a short time ago at the Little Theatre, London, will not fail to tune in 5GB on January 24, when two "thrillers" are being broadcast. The first is entitled *The Test*, by J. A. W. Shepherd, and the second, a new play, *The Witch Wife* is by Mabel Constanduros and Michael Hogan.

#### A New Radio Writer

MR. TEMPLE THURSTON, who has lately joined the ranks of the writers of radio drama, has written a special play, entitled *The Burden of Women*, to be broadcast from the Savoy Hill studio on February 7. The plot deals with the hard life of the sailor's wife who anxiously awaits the return of her husband.

#### The Musician's Paradise!

THERE is one section of the community who must really be very grateful to the B.B.C. These are the composers and song-writers, for the B.B.C. is always willing to consider any new composition and if one seems to have any value it is always played over by a full orchestra. We have not yet heard of a starving musician being found outside 2LO.

#### A Future Development

A FEW weeks ago Thermion hinted at litrode valve developments to come, and from recent rumours from a certain quarter it seems that Thermion is again right!

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# ZEESEN—The Most Powerful Broadcasting Station in the World

FIRST-HAND DETAILS BY DR. ALFRED GRADENWITZ

AS most readers are aware, the most powerful broadcast transmitting plant in the world has been completed and was put into operation on December 20, at Zeesen, near Königswusterhausen, about 25 kilometres from Berlin.

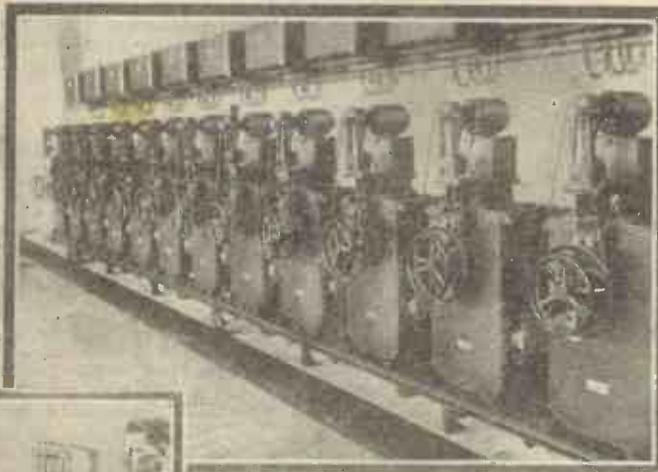
In order to give an idea of the unusual power of this new transmitter it may be said that, while the Witzleben, Berlin, transmitter has only an output of 9 kilowatts, and the old "German programme" transmitter, the functions of which the new transmitter is taking over, 9 kilowatts in the intermediate circuit, the new transmitting plant has been designed for a capacity of no less than 120 kilowatts, thus outdoing not only all German transmitters, but Daventry with 20 kilowatts and Schenectady with about 80 kilowatts.

The anode-tension of 10,000 volts for the three stages is derived from one high vacuum rectifier arrangement which, through an H.T. transformer, is operated direct from the three-phase current system

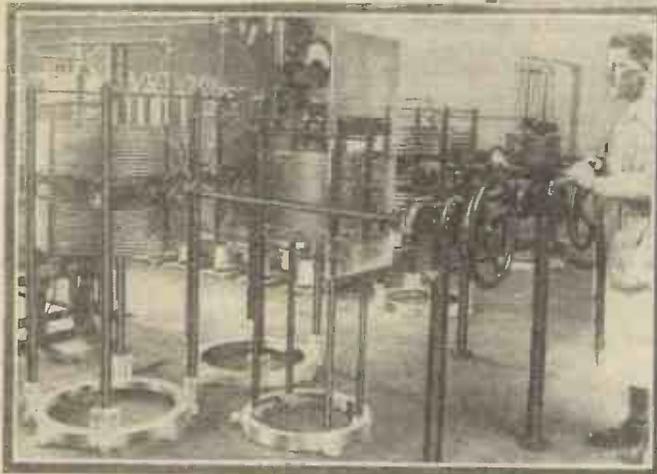
studio serves to control the transmitter plant. The aerial is carried by two insulated wire-braced iron-frame masts, 700 ft. high and 1,500 ft. distant from one another. The aerial is of the "T" type, about 1,000 ft. long and 20 ft. wide. A small-meshed network, about 2,500 ft. long and 1,000 ft. wide, buried in the ground, is used as the earth.

Apart from the social and political importance of the new giant transmitter, the German Postal Department has been anxious to avail itself of this installation with a view to counteracting the present decline in interest taken in wireless. In order, therefore, to

provide a greater choice of programmes, the two-programme system was adopted, and inasmuch as, on account of mutual disturbances, the installation of several transmitters in the same town was not desirable; a high-power transmitter was provided which enables most listeners to choose between the programmes of the local transmitter and those of the new Zeesen high-power station. In fact, Zeesen is not to broadcast Berlin's evening programme, as the old Königswusterhausen transmitter mostly did, but is to pick out the very best of the various German programmes. The new transmitter is to be operated on a very long wave (possibly 2,000 to 3,000 metres). One of the Aerial Masts



These two photographs of the Control Panel and Tuning Inductances show the unique design of the plant at the Zeesen Station



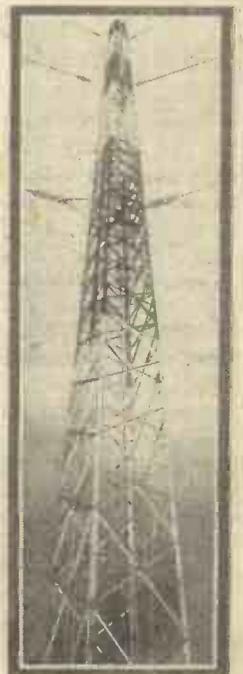
The new transmitter is at the present unparalleled in the world, constituting as it does a central transmitter for covering the whole of Germany and destined to be received throughout the country with simple receiving sets. In the whole of northern, central, and part of western Germany reception will even be possible with the cheap, and therefore most widely used crystal apparatus, while in other parts of Germany the most simple type of valve receiver will be sufficient. Moreover, there will not be any difficulty in receiving the new transmitter in the rest of Europe.

There have been provided three stages, viz., the modulating transmitter, the intermediate amplifier, and the output ampli-

parallel (third stage), three modulating valves, and one rectifier valve for generating the grid bias for the modulating valves.

In addition to the 220-volt continuous-current generator for feeding the auxiliary circuits, there have been provided the following converters: One 40-volt machine for heating the oscillating valves for the first two transmitter stages and the auxiliary rectifier valve, one 2,000-volt converter for generating the grid bias for the third-stage valves, one converter generating the anode tension for the terminal amplifier, and one for charging the batteries.

A switchboard desk installed in the



# THE "ECONOMY" ONE

By  
THE "A.W."  
TECHNICAL STAFF

A SINGLE-VALVE  
SET FOR 15/-

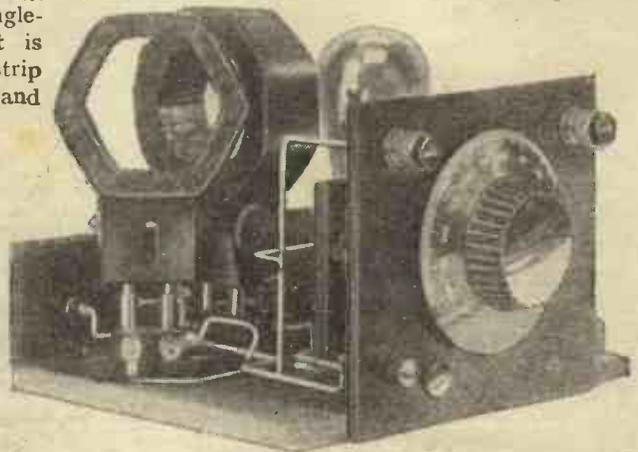
**P**OWERFUL headphone signals from a number of broadcasting stations can be received with the simple and inexpensive one-valver illustrated here.

It is designed on lines similar to the "30s. Two-valver" recently described in these pages. That is to say, only the essential components are included, and the layout is compact but efficient. A small ebonite panel, 5 in. by 4½ in., accommo-

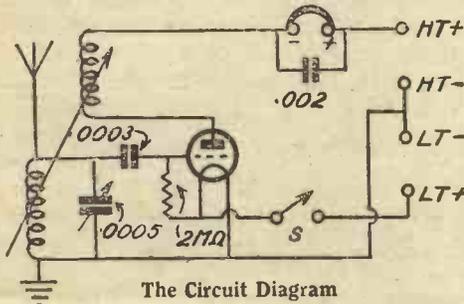
scientifically-inclined members of the family.

On the baseboard, to which the control panel is screwed, are five small and inexpensive parts: (1) The valve-holder. (2) grid leak and condenser. (3) By-pass condenser. (4) and (5) Single-coil mounts. The layout is completed by the terminal strip which carries the phones and batteries terminals.

fixed condenser, which is usually necessary to by-pass the H.F. current flowing in the anode circuit. Without this condenser "ploppy" and erratic reaction effects are usually experienced. There is no filament resistance, as this is not essential if a 2-volt



The Complete 15/- One-valver valve is used with a 2-volt accumulator. A switch is connected in the L.T.+ lead.



The Circuit Diagram

dates the variable tuning condenser, the filament "on-off" switch and the aerial and earth terminals.

### Simple Control

The main control is the variable condenser dial, but if only one station is to be habitually received, the "on-off" switch constitutes the *only* control. Thus the receiver should find favour amongst the less

### Circuit

Constructors will be interested in the circuit arrangement incorporated. A glance at the diagram will show that no deviation from the "straight" arrangement has been made, simply because for really efficient results with an absolute minimum of components, the standard arrangement cannot be easily improved upon. A plug-in coil, No. 35 or No. 40 is tuned by a parallel .0005-microfarad variable condenser.

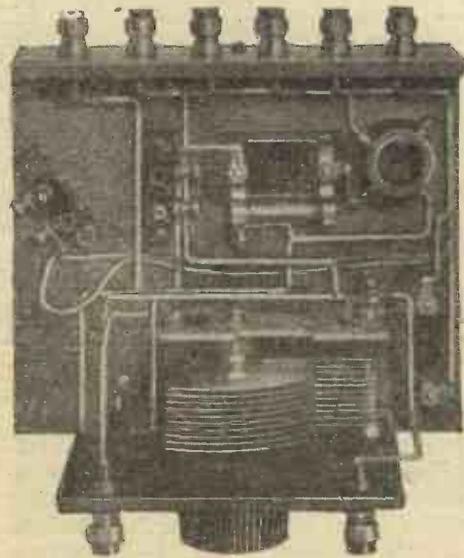
### Series Grid Leak

A .0003-microfarad grid condenser and 2-megohm grid leak are connected as shown for rectifying purposes. Note that the grid leak is connected between the grid and L.T.+ and *not* across the grid condenser. Thus it is necessary to insulate the grid-leak clip clamped under the grid condenser terminal, remote from the grid, so that the "free" end of the grid leak can be separately connected to L.T.+.

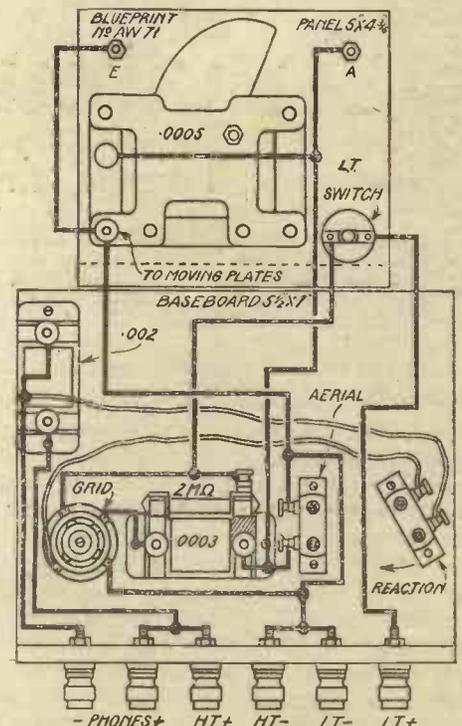
Messrs. Dubilier supply this insulated clip with their fixed condensers, although, if desired, a separate holder can be used for the grid leak.

In series with the anode of the valve and the phones is shown another coil, which can be a No. 60 plug-in coil, used for reaction. This coil is variably coupled to the tuning coil; the closer together the coils are the greater is the increase in signal strength. It is important to see that the coils are coupled in the right "sense," otherwise when the reaction coil is brought nearer the tuning coil a *decrease* in signal strength will result!

Across the phones is a .002-microfarad



This Plan View shows the Simple Construction



The Wiring Diagram, Blueprint available, Price 1/-

**Components**

Ebonite or bakelite panel, 4½ in. by 5 in. by ¼ in. (Raymond, Pertinax, Becol).  
 .0005-microfarad variable condenser (Ormond, Burton, Cyldon, Jackson).

Two single baseboard coil-holders (L. and P., Lissen). Baseboard-mounting valve-holder (Lissen, Benjamin).

.0003-microfarad fixed condenser, with series clip (Dubilier, Lissen, T.C.C.).

.002-microfarad fixed condenser (Dubilier, Lissen, T.C.C.).

2-megohm grid leak (Dubilier, Lissen).

Ebonite strip, 7 in. by 2 in. by ¼ in. (Ebonart, Becol).

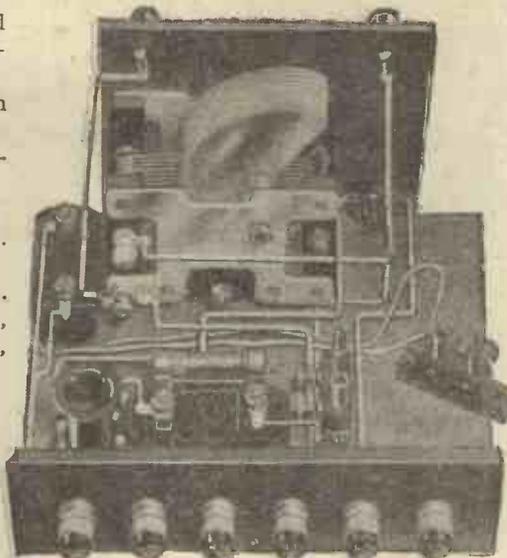
Push-pull battery switch (Bulgin, Trix).

Eight terminals, marked: A, E, L.T.+, L.T.-, H.T.-, H.T.+, Phones+, Phones- (Belling-Lee, Eelex).

Connecting wire (Glazite, Junit).

The general layout has already been explained, but there is one point which calls for comment. The reaction-coil coupling variations are effected by swivelling the single-coil mount carrying the reaction coil. This mount is attached to baseboard with one wood-screw which is prevented from working loose by inserting a washer between the screw and the mount. Although this system may appear somewhat crude, it must be remembered that

Wiring is a straightforward business and Glazite or Junit wire can be relied upon to give good results. The flexible reaction-coil connections consist of short lengths of



A Rear View of the Economy One

Lewcos rubber-covered flex, one from the phones negative terminal and the other from the anode connection of the valve-holder.

ing," in which case a closer coupling can be made.

The running costs of the "Economy One" are very low, a 2 volt 20-amp. accumulator and a 45-60 volt H.T. battery supplying all the "juice" required. Suitable alternative valves to the Cossor 210 H.F. specified, which we know from experience will give good results are the B.T.H. B210H, Cosmos SP18/G, Ediswan H.F.210, Marconi DEL210, Mullard PM1 H.F., Osram DEL210 and Six Sixty SS210 H.F.

### THREE-WIRE HOUSE-MAINS

FOR reasons of economy many electric companies distribute their supply on what is known as the three-wire or neutral line system. This allows them to generate the lighting current at, say, 440 volts, whilst at the same time limiting the house pressure to the comparatively safe level of 220 volts. The higher voltage exists between the two "outer" mains, and is dropped in two equal stages of 220 volts between the positive outer and the neutral, and from the latter to the negative outer.

# FREE : Full-size Blueprint

## " Britain's Favourite Three "

with next week's

# Amateur Wireless, usual price 3d.

This is the set which was accorded first place in the recent "A.W." Voting Competition.

**Make sure of your copy by ordering NOW!**

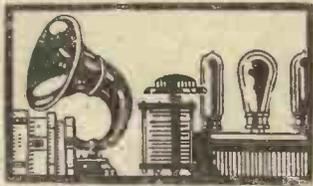
for ordinary use the reaction coil will be fixed at one particularly suitable coupling position for local-station reception. Without actually oscillating it is possible to pick up Daventry 5GB at good phone strength and Daventry 5XX can be well heard with a No. 150 plug-in tuning coil and No. 75 or No. 100 reaction coil.

The simple drilling and mounting operations are well within the capabilities of all constructors especially with the aid of the full size blueprint (price 1s.) which has been specially prepared by the AMATEUR WIRELESS draughtsmen.

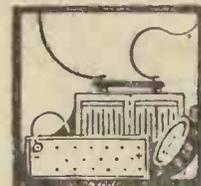
#### Testing

Carefully check over the wiring before connecting up any batteries. Then insert an "H.F." type of valve such as the Cossor 210 H.F., in the valve-holder and appropriate coils in the coil mounts. Connect up the H.T. and L.T. batteries and phones to their respective terminals on the strip, pull out the filament switch and rotate the variable condenser dial until good headphone signals are heard from the local station. Keep the reaction-coil almost at right angles to the tuning coil unless the signal strength requires "boost-

The current supply is balanced so that certain houses are fed from the neutral and positive outer, whilst other houses take current from the neutral and the negative outer. In all cases the neutral line is "earthed," so that the "live" wire is sometimes at 220 volts positive, whilst in others it is 220 volts negative, relatively to earth. It is well to ascertain the exact conditions before fitting battery eliminators to receivers. In all cases a blocking condenser should be inserted in the earth lead of the aerial to prevent an accidental short-circuiting of the power mains. M. A. L.



# PRACTICAL ODDS & ENDS



## Useful Resistance Unit

THE experimental resistance unit shown in Fig. 1 is made up from eight sheet brass clips with bolts and nuts, eight flush-type valve sockets, four terminals, and a suitable ebonite panel, which is mounted on two wooden runners, the resistances being connected in series by means of the links, and the connections taken to the

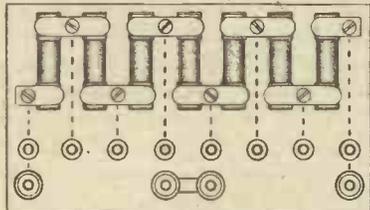


Fig. 1—The Resistance Unit

sockets under the panel, as shown by the dotted lines. The two outer terminals are connected to the two outer sockets, and the two inner terminals simply linked together by means of a short length of sheet brass. Resistances made from blotting-paper and Indian ink will be quite suitable though, of course, resistances of the ordinary type may be used. Such resistances should have a value of about 60,000 ohms.

The arrangement will be found useful for many purposes. If we take a lead from the extreme left-hand terminal (Fig. 1) and another from one of the central terminals, and connect a short flexible lead with a plug to the other central terminal,

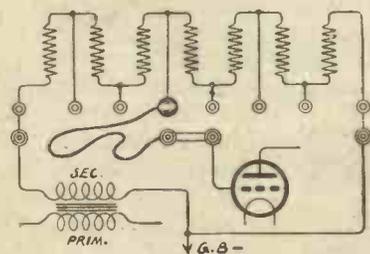


Fig. 2—Connections of the Resistance Unit

we can easily tap off any value of resistance in 60,000-ohm stages, from 60,000 to 420,000 ohms (approximately), by inserting the plug in appropriate sockets.

Another use for the unit is shown in Fig. 2, where it is made to replace the usual H.R. potentiometer used as a volume control in a transformer-coupled L.F. amplifier. The two outer terminals (total resistance of about 420,000 ohms) are permanently connected across the secondary terminals of the transformer, the O.S. being joined to G.B. negative as usual, and the

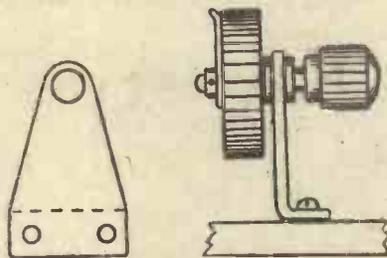
grid of the L.F. valve is connected permanently to one of the central terminals. A flexible lead with plug is joined to the other central terminal, the plug then being adjusted until the desired degree of volume is obtained. Thus, in effect, the resistances in series form the potentiometer helix, and the plug the movable arm. The unit can be made up very cheaply and will be found a valuable adjunct to any experimental outfit.

O. J. R.

## Rheostat Mounting

PANEL-MOUNTING filament rheostats may be easily arranged as baseboard-mounting rheostats by providing a suitable mounting device.

The most usual method is to mount the rheostats on a strip of ebonite which is supported by two spacing tubes and screwed down to the baseboard. This means grouping the rheostats; i.e., placing them all together, and where space permits, the method is usually satisfactory.



Rheostat Mounting

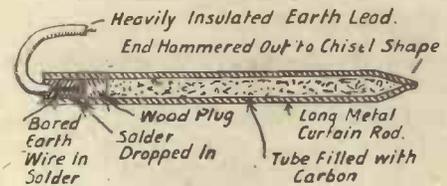
But in cases where it is desired to mount the rheostats against their respective valve holders it will be found best to cut out simple angle clips and arrange them as shown in the sketch. The clips should be made from fairly stout sheet brass, copper, or zinc strips, about 1 1/4 in. wide, their length, of course, depending upon the diameter of the rheostats. They are first cut out and drilled as shown on the left, and then bent to right angles at the dotted line. They should be screwed down to the baseboard before fitting the rheostat knob.—R. M.

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FAVOURITE THREE”**  
embodies  
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∴ Have you seen the ∴  
announcement on page 83?

## An Excellent Earth Tube

A REALLY excellent and efficient earth tube may be made in the following manner: First procure a fairly long metal curtain rod. Hammer one end out to a chisel shape. Fill the tube thus prepared nearly to the top with carbon, or charcoal. Then insert a wood plug, as shown, in the drawing. Place the bared end of the insulated earth lead in the top end of the tube and pour in solder, thus making a permanent and sure contact.

The solder will be prevented from running down the tube by the wood plug already inserted. When complete, drive the tube well into the earth and water occasionally. The carbon filling ensures a good earth at all times, even should the metal casing



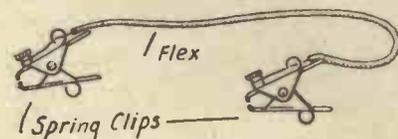
An Excellent Earth Tube

become carbonised or eaten away with rust. By watering the tube occasionally the earth will always be kept at its best. As the tube used is usually split, the moisture will reach the carbon inside.—B.

## A Trying-out Link

IT is often found necessary in constructional work to make a single temporary connection from point to point in order to test results obtained thereby, or to put a certain theory into practice. It is not always desirable to go to the trouble of fixing such a connection, as one may need to rapidly place the wire between other alternative points.

A useful and simple little device for this purpose takes the form of a suitable length of flex wire, to the end of which is secured



A Trying-out Link

a spring clip, such as may be obtained for this purpose. When it is necessary to try out a certain connection, one only has to clip on each end of this trying-out link or lead to the appropriate points. If it is not found satisfactory, it can be immediately detached and tried out elsewhere.—A. C.

# FINISHING THE HOME-MADE CABINET

*Easy Methods for the Amateur*



**M**ANY amateur wireless constructors build their own sets, but few are able to finish the cabinet so that it does not look out of place in a drawing-room. Numerous excellent cabinets are now on the market, but apart from the fact that the home-made cabinet is a great saving, it gives the builder greater pleasure to construct both the cabinet and its contents. The difficulty of the amateur cabinet-maker lies chiefly in polishing, but a few hints will greatly simplify this task.

## "Filling"

Planed boards of varying thicknesses in white wood, satin walnut, mahogany and oak are now easily obtainable, but if they are to be polished, it is important that no end fibres should be exposed, as these assume a much darker colour than the faces when the polish is applied.

The cabinet completed, the surface is rubbed down, first with medium and then with fine glass-paper wrapped round a block of planed wood to obtain a flat surface contact. Before polishing is attempted, the grain should be "filled." Proprietary makes of grain filler are obtainable ready prepared, but it is a simple matter to make one up for oneself.

One of the most efficacious "fillers" consists of finely-crushed whiting mixed to a paste with methylated spirits. Rose pink colouring should be added to the mixture when filling mahogany, and ochre when oak is the wood chosen. The filling dried, the wood is rubbed down again and treated very lightly with linseed oil.

Detailed instructions on the application of polishes cannot be given here, but it is the composition of the polish and not the application which is the amateur cabinet-maker's chief obstacle. A good general-purpose polish can be obtained by dissolving a pound of orange shellac, an ounce of gum arabic and an ounce of gum copal in half a gallon of methylated spirits. Two ounces of gum sandarach or gum mastic can be used instead of the copal and arabic gums.

## Stains

If water stains are considered undesirable, dyes may be added to the polish itself.

Gamboge or yellow ochre dissolved in white polish gives a yellow for oak, while brown is produced by adding vandyke brown, and red by bismarck brown. A more subdued tone of red can be obtained with two ounces of red sanders to a pint of polish. Walnut is obtained by adding about a quarter of an ounce of spirit walnut to the polish. A good dense black can be prepared by using half an ounce of spirit black and a trace of washing blue.

## Plywood

Plywood requires slightly different treatment from ordinary boards, but the method is quite simple. It should be rubbed down with fine sandpaper, and when it is perfectly smooth, some time with a handful of



The polish is applied with a small linen pad finally with a cloth. Linseed oil is then applied and allowed to soak in thoroughly. If the grain stands up after this, repeat the rubbing down and oiling until a good surface is obtained.

When this method is followed out, plywood takes on a beautiful glossy surface, which can be made permanent by finishing it with the mixture of beeswax and turpentine generally used for floors and furniture.

Still more ambitious effects can be obtained by fuming the wood with ammonia and applying bronze powder stirred into varnish for gold decorations. With the black mentioned above and a "gold" paint, the amateur who knows something of drawing can produce really picturesque

Oriental touches. Black and gold are the most often used, but if another colour is desired, it should be very subdued, or the effect will be crude and tawdry.

An excellent lacquer finish for Oriental cabinets is made by dissolving scrap celluloid in amyl-acetate and adding a small quantity of fine brass filings.

## WIRED WIRELESS AGAIN?

**T**HE idea of a central receiving station picking up a number of distant transmissions, and relaying any items required by telephone subscribers, is not new. In fact, there is an enterprising wireless expert who, with the full permission of the G.P.O., regularly relays the local station which he picks up on a powerful receiver to over twenty subscribers.

But a much more ambitious scheme which may become a practical reality in the near future is foreshadowed in an article which recently appeared in the *Daily Mail*. It is stated that, with the co-operation of the G.P.O., there is a good prospect of telephone subscribers having wireless "on tap" without the necessity for individual wireless installations. A batch of super-heterodyne receivers would pick up the best Continental transmissions on separate frame aerials and amplify the signals to the strength desired by the subscribers, who would simply ring up the exchange for, say, an hour's opera from Germany or a 10-minute talk from Vienna and so on.

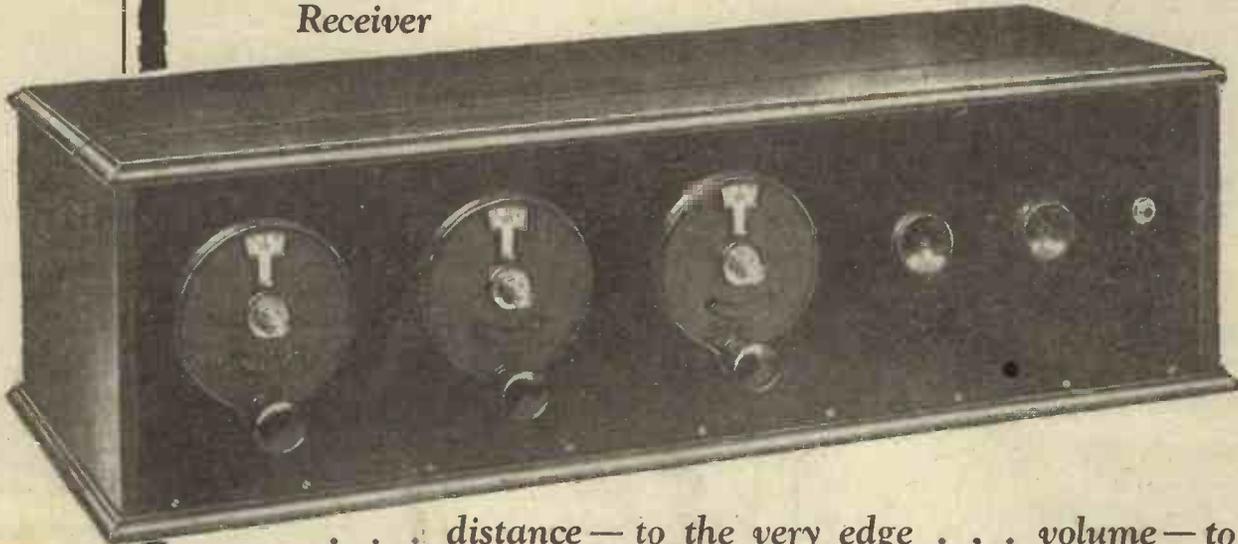
In a conversation with an official of the G.P.O. an AMATEUR WIRELESS representative learned that so far no such scheme had been submitted to the G.P.O. and it was, therefore, impossible to pass any definite comment on the proposal. If at any time details of such a scheme were submitted they would, of course, receive the consideration of the G.P.O.



A fine piece of Cabinet work by an "A.W." reader, housing both Gramophone and Wireless Receiver

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\* \* \*

*"I have built countless sets, but now I have made a real set, viz. your wonderful Raleigh P.M. receiver! I am less than half-a-mile from the Stoke transmitter, but this no longer troubles me, and although I only completed the set last week I have logged 21 stations and there are many more to be brought in, I know. So selective is the set that I can get Stuttgart without a trace of Manchester although there are only 4 metres difference and Manchester is 35 miles away."*

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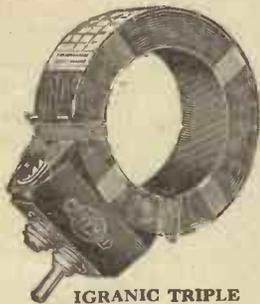
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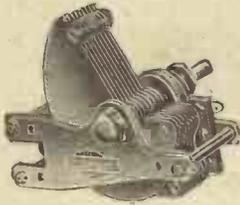
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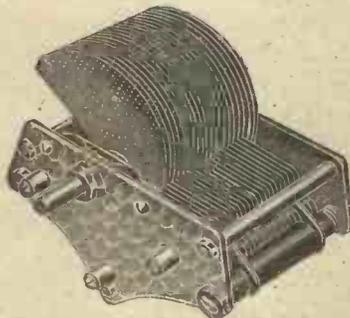
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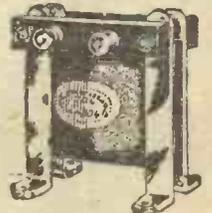
It can be safely claimed that the STANDARD Model Transformer has positively no equal at the price. Recently designed, its amplification and tone have benefited to the extent of 25 per cent. Weight, 12 oz. Height, 3½ in. Width, 2½ in. Depth, 1½ in.  
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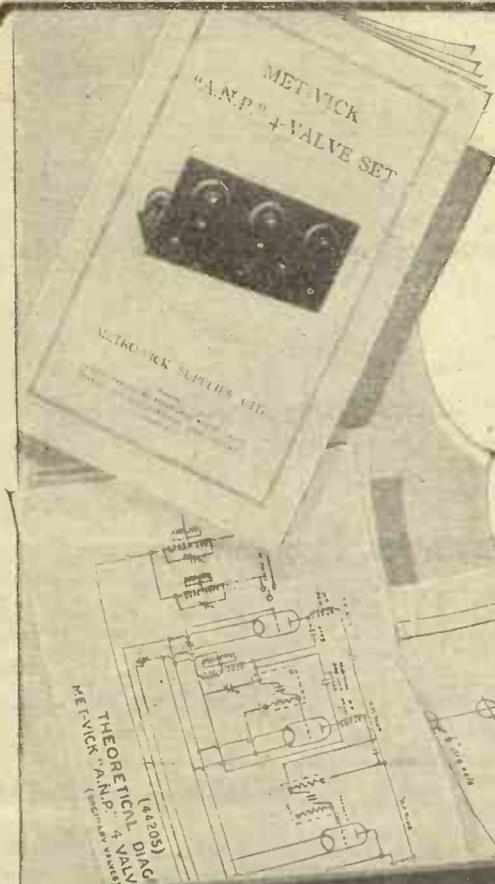


The Orchestrals Model Transformer is incorporated in the Hartley D.X. Three, described in the December 31 issue of this paper.

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## For working off the Electric Light Mains

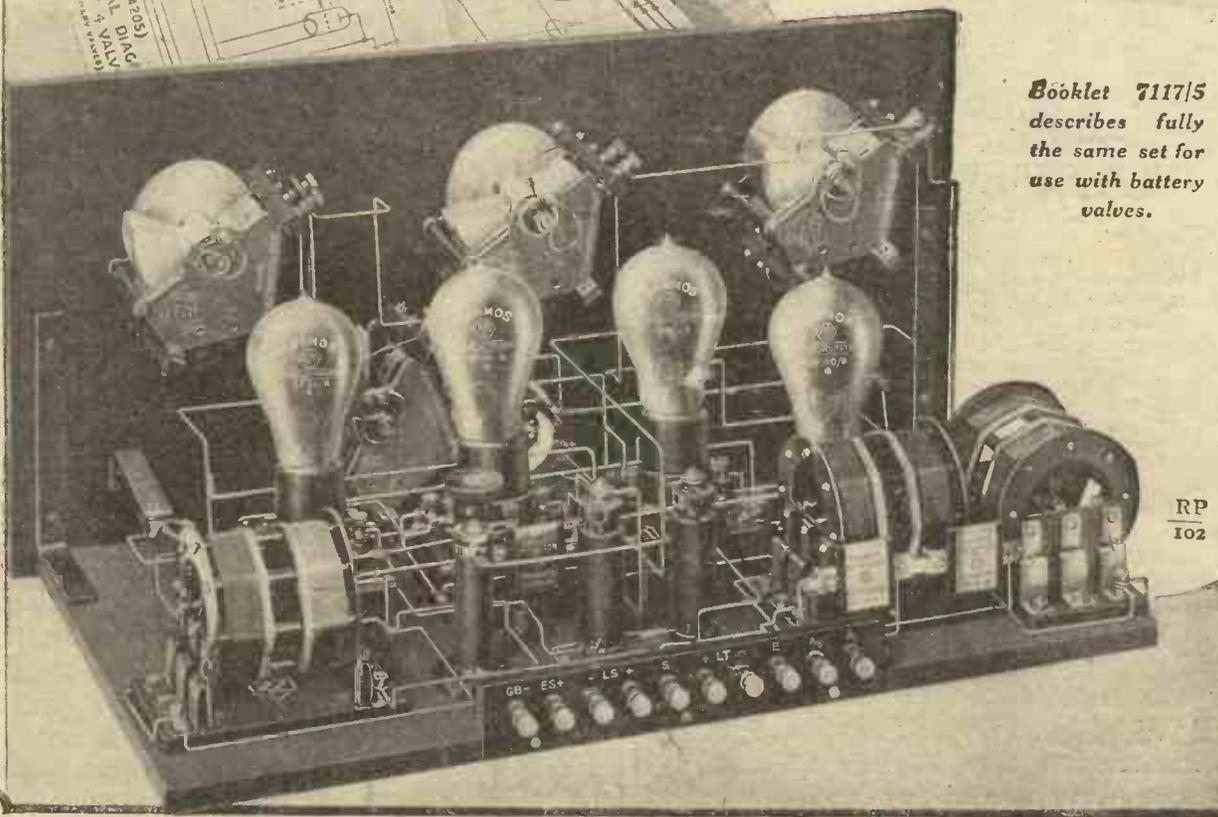
The "Met-Vick" 4-Valve A.N.P. Set, shown on this page, can also be constructed for working direct from the electric light mains. This involves the use of "Cosmos" A.C. Valves and Battery Eliminators, and is fully described in the booklet 7117/4, obtainable from your wireless dealer complete with drilling template and wiring diagrams. The performance of the set is astonishingly good, giving great selectivity with a wide range, high quality of reproduction and simplicity of operation.

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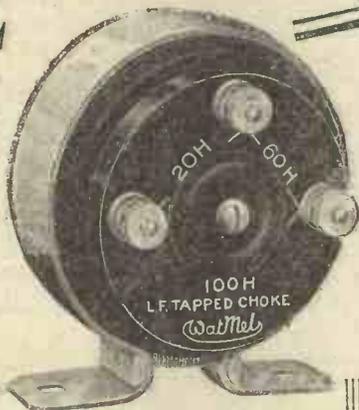
*Booklet 7117/5 describes fully the same set for use with battery valves.*

RP  
102

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described on page 100

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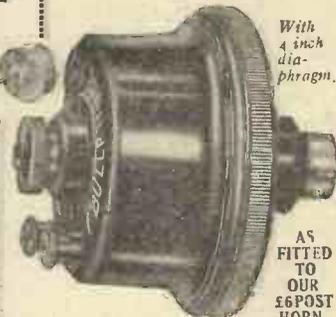
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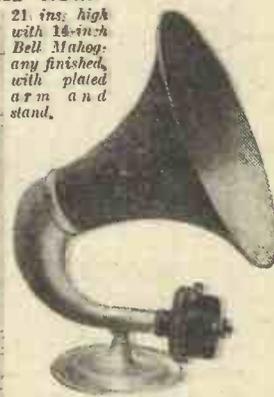
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# On Your Wavleneth!

## English as She is Spoke . . .

WILLY-NILLY, the B.B.C.—through its announcers and, to a less degree, through its topical talkers—is exercising a very big influence over the pronunciation of English in the country at large. Like so many more new inventions, wireless is having a vast effect upon the spoken language. Up to about a hundred years ago there was no such thing as standard English, but, as the result of scientific progress, counties and towns are no longer water-tight compartments so far as language is concerned. Since wireless has such tremendous effect upon standard English, it is advisable that the announcers should use accepted pronunciations. Hence the B.B.C.'s Advisory Committee on the subject. Unfortunately, not by any means all of the recommendations of this committee met with general approval, and in my humble view the Corporation would do better to provide at each broadcasting centre a copy of the Oxford English Dictionary, whose last section has just been completed after thirty-six years of work. The dictionary, which contains 400,000 words, indicates the accepted pronunciations in the clearest possible manner. It is obviously of no use to have two standard pronunciations—one in the dictionary and one in the broadcasting studio.

## . . . and Wrote

If we are getting nearer to standard pronunciation of English we are probably drawing further away from the standard written language. The Americans in particular do some wonderful things with words. One of the best that I have ever seen occurred the other day in a Yank lay paper. "New Circuit Obsoletes Your Radio" screamed a heading in the largest type. "Obsoletes" is a beautiful word, is it not?

## Real Slaughter

But I think that pride of place in the matter of slaying English must be given to the ingenious Continental manufacturer of wireless parts who desires to find a market for his goods in this country, and sends out with them a little leaflet giving instructions for their use in what he fondly imagines is the language of John Bull. One of these leaflets accompanied a foreign battery that came my way the other day. "The most of radio hearers," it began, "use to possess an apparel for to receive good the broadcasting from a close station." It went on (very sensibly) to recommend the use of a "volts meter of elevated resistance for the testation of high stretching batteries." Really, I think I almost prefer "high stretching" to high tension; there is something rather noble in the expression.

## "Thermion" Buys it Too

"I wonder what happened to 2LO the other night," said I to a friend. "Apparently something very much was wrong with his transmitter, for his signal strength was all over the place—now up, now down." The friend had not used his set on the occasion referred to, but we quite agreed that it was disgraceful that the B.B.C. should allow its stations to go on in this way. In fact, we got quite heated about it. That evening 2LO was still wobbling like anything. Then I bethought me that there was an alternative programme which might just as well be used in such circumstances. I turned over to 5GB, who was also wobbling; so were Bournemouth and Belfast and Newcastle and Cardiff and Glasgow and Manchester. The whole B.B.C. outfit was wobbling. The business seemed more disgraceful than ever. If the home stations could supply nothing worth listening to, I would go abroad for my wireless fare. Langenberg was wobbling, Frankfurt was wobbling, Radio-Paris was wobbling, Stuttgart was wobbling. The whole of Europe was wobbling. I was perfectly sure that this was the case, for, like Caesar's wife, my set was, of course, above suspicion.

## Ether Wobble?

I was just meditating an article on "Ether Wobble", to prove the original jelly theory, when in came a friend. "Just listen to this!" I cried, switching on Toulouse. "What on earth's happened to your set?" asked the friend. "The set's all right," I said, "it's the whole ether that's upset." He assured me that it was not upset round at his home, for he had been having excellent reception until the moment of leaving to come to see me. We tested the batteries, the valves, the coils, and the condensers. We fiddled about with the leads inside the cabinet to see if any of them were loose. We spent quite a long time, in fact, trying to find out what was the matter.

## Simple!

We turned on London again, and whilst he was still wobbling away like anything I happened to touch the earth lead. There was an instant response, in the shape of a positive roar, followed by a whisper, and then a roar again. Yes, that is what it was. The ether was not wobbling; the article on the jelly theory will never be written; but I will in future take steps to see that my earth-wire terminal is properly screwed up before the evening's work begins.

## Good News

I mentioned recently the experiences of a firm of battery manufacturers who had experimented with the marketing of high-tension batteries of larger capacity than

the standard type. It was actually some little time ago, when the public showed its lack of approval by refusing to buy those bigger fellows. To-day there are signs that some, at any rate, of the great wireless public are waking up to the fact that the bigger battery is a sound investment. Several firms have told me, within the last week or two, that there is a distinctly bigger demand for the medium and large capacity battery. This is the best news that I have heard for some time, for it means that wireless is at last going to have a proper chance.

## Tired Batteries

It is jolly hard lines on the B.B.C. that their excellent transmissions should be distorted towards the end of the evening simply because the H.T. batteries used in receiving sets are not up to their work. It does not give the designers of multi-valve sets a real chance, for quality, signal strength, and probably stability are likely to suffer if a big fall in voltage takes place during a three or four hours' run. Nor again is it really fair to the maker of good batteries if you use small sizes to do the work of big 'uns. He tells you quite frankly that they won't deal with more than a certain load economically, and if you go and give them two or three times that load, and they run out rather quickly you probably say to yourself and your friends that the So-and-So battery is rotten, just because it will not accomplish the impossible. There is just about as much sense in working a five-valver from a standard-capacity battery as in trying to wear a collar about two inches too small for you.

## An Interesting Valve

Though screened-grid valves were made experimentally in America some time ago, manufacturers over there have been rather slow about putting them on the market. I hear that a screened-grid valve is now obtainable in the States, and this is one of a rather interesting type, since it can be used in two quite different ways. You can hook it up first of all in the normal way, using the outer grid for screening purposes and the inner as control grid. But you can also use it like the earlier four-electrode valves for low-frequency amplification. In this case the outer grid becomes the control grid, whilst the inner, kept at a moderate positive potential, is used to reduce the space charge effects round the filament.

## Worthy of Experiment

Enormous amplification at high-frequency with perfect stability is obtained when the valve is used as a screened-grid affair, whilst very high amplification, again, results on the low-frequency side

## On Your Wavelength! (continued)

when the grids are changed over in the way described. It is quite possible, of course, that some of our own screened-grid valves can be used in the same way. I have not yet had time to experiment with them, though I hope to do so before very long. Anyhow, there are distinctly interesting possibilities for the valve that will function in two quite different ways and that will give big amplification on both sides of the set. It must be added that when the outer grid is used for control purposes these valves make highly efficient rectifiers.

### 11-15 p.m.

I have been using a set at home recently which is capable of tuning to the short wavelengths only; when I come home at night at about 11 o'clock, I dash over to the window-sill and switch on London for the dance music. If I am unlucky, London has closed down; nothing undaunted, I tune in 5GB and hear the welcome sound of dance music. No sooner, however, have I settled down in front of the fire than Big Ben strikes the quarter hour and silence follows. It does seem rather unfortunate that 5GB does not follow its elder brother and continue until 12 o'clock. The only remedy is to adapt the set for receiving high wavelengths; alternatively we must rely on some foreign station to provide the necessary entertainment (and unnecessary interference).

### Plays: A Suggestion

The broadcasting of good plays is very popular with those leisured people who can listen to the whole or a large part of the evening's programme. When, however, one butts into the middle of a play, however thrilling or interesting (unless one happens to know the piece actually being broadcast) it is a matter of great difficulty to pick up the thread of the story.

It might be a good idea, when long plays are being broadcast, to have one or more intervals during which time a synopsis of the portion already performed could be given, so that the new listener would have an opportunity of understanding and taking an interest in the remaining performance. After all, we have our intervals in a play on the stage, which are considered more or less necessary by large numbers of the audience as well as the performers. Naturally, a lengthy and complete account of the performance would not be welcome, but a brief survey should not spoil the performance for other people.

### 'Ware Old Components

Most of us have a certain number of components which we acquired a good many years ago, and with which we cannot bear to part, since, to all appearances, there is nothing very much wrong with them. The trouble is that, when making up new circuits which demand highly

efficient components, there is always a temptation to press some of the old friends into service. Sometimes this works out all right; but in many cases, especially upon the high-frequency side, it leads to very poor results. A case in point is the kind of variable condenser that was almost a standard article three or four years ago. You know the sort that I mean. It had metal end plates, electrically connected to the fixed vanes, and the moving vanes were carried by a spindle, insulated only by bushes of ebonite mounted in the end-pieces. The losses in such a condenser are, in any case, high, and if the bushes have deteriorated with the passage of time, the insulation may be very poor indeed. The use of such a condenser in a modern high-frequency circuit will probably lead to a great loss in efficiency, and there may be queer and quite unwanted results as well.

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will be given with  
**NEXT WEEK'S "A.W."**

Keep old components for circuits where efficiency does not greatly matter, but do not attempt to use them in those where losses must be kept low.

### Those Mystery Stations

There is a station which has been a mystery to me for two months. It comes through on a wavelength of 297 metres. Now, this happens to be the wavelength for Liverpool (6LV), Radio Agen (France), and Hanover (Germany). More often than not, Innsbruck (Austria), with the catalogued wavelength of 294.1 metres, manages to get into the way of the above three. So there are four stations on the same wavelength. However, a fifth station has got stuck on this spot of late. The language spoken is Italian. There seems to be nothing but talks, and they are ceaseless from 9 p.m. until midnight. The nearest Italian station is Milan, with a wavelength of 317 metres, and it is not likely that that station gets down to 297 metres. That the station is Italian is fairly evident, because the propaganda is not Bolshevik, but Fascist.

### ... and Another

There is again a mystery station in the neighbourhood of Kharkov (Russia) on 1,700 metres. This is a Russian station, if the preponderance of the language spoken is any criterion, although it should be noted that on occasions French and German are used, both without signs of the foreigner

in accent. It appeared that this station was Kharkov at first, but when that station was broadcasting music one evening a faint conversation came through. A slight adjustment brought the music and the speaking through about equally.

### San Sebastian

Can you still recall the enthusiasm with which the broadcasts from San Sebastian were greeted in their early days? It is an old friend of ours, whose transmissions at that period I captured almost nightly very successfully; yet during the past few months but little has been heard of it. Like many competitors in the Iberic Peninsula, it has passed through bad times, as it has lacked the financial support of former admirers. Now, fortunately, since it has joined the Madrid group, it has acquired a fresh and more vigorous lease of life; it is, in fact, one link of the growing chain of broadcasters which includes Barcelona (EAJ1), Bilbao (EAJ9), Seville (EAJ5), and Salamanca (EAJ22).

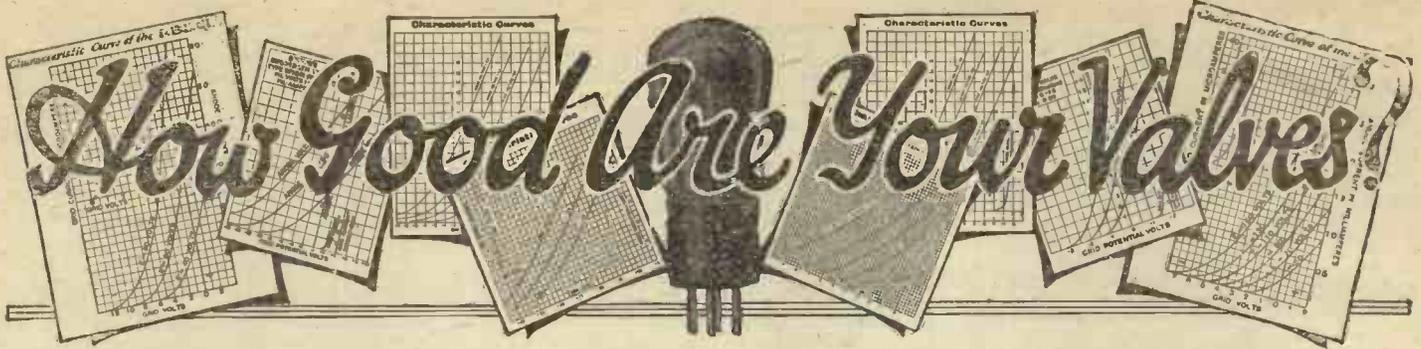
### Worth Listening For

On its present wavelength of 335 metres—a position in the middle waveband which is not yet too congested—its transmissions come through to the British Isles at the same good strength as of yore. It is late evening, however, when it goes on the air for the first item, a peal of bells from its local town hall; they cannot be heard before 10 p.m., but it is seldom that the programme comes to an end before 12.30 a.m. On three evenings weekly it provides its own local concerts, but for its best entertainments it looks to EAJ7 (Madrid), which thrice weekly feeds the other units of its system.

### Spare Teams Wanted

If you don't listen to 2XAD's commentaries of American games on Saturday evenings you are missing something. I regard them as amongst the brightest spots of the wireless week. Baseball must be, as our friends would say, "some game." Though I have not the faintest idea of its rules, I am always thrilled to the marrow in my bones by the descriptions. About every minute the commentator announces that So-and-so is out of the game and somebody else takes his place. The teams go on to the field padded from head to foot, but this does not prevent casualties from occurring with considerable frequency. In a recent Yale and Harvard match, so far as I could make out, almost every original member of the teams was knocked out and replaced by a substitute. Can anybody tell me where I can get a book of rules of American baseball? When the announcer talks about Yale's seventeen or twenty-six or thirty-four yard line is he referring to a plan such as those used by the B.B.C.?

THERMION.



This is the second of a short series of articles by our Technical Editor, discussing the subject of valves in different positions in the receiver, and how the relative merits of different types may be gauged for various purposes

## ALL ABOUT MUTUAL CONDUCTANCE

IN the first article of this series we discussed the general properties of the ordinary three-electrode valve and showed how voltages applied across the grid and filament of the valve would produce variations in the anode current. By drawing a graph of the variation of anode current with grid voltage, we were able to deduce three primary factors relating to the actual performance of the valve. These were the mutual conductance, the A.C. anode resistance, and the amplification factor.

Before discussing the matter any further, it will be as well to consider now a practical case and show how these various factors affect the results. Let us consider the simplest possible case—that of a valve having a resistance in the anode circuit. The result obtained from this consideration will be similar in form to those applying in all other cases, and they will therefore serve to illustrate what is happening.

### A Practical Circuit

The circuit is shown by the diagram. We apply a voltage  $V_g$  across the grid and filament of the valve. This causes variations in the anode current in conformity with the grid-voltage variations. From a characteristic curve, such as that shown in the first article, we can obtain the variations of anode current produced by any given variation in the grid voltage. This is only correct, however, for a valve under the conditions for which the characteristic was taken, namely, with no external impedance in the anode circuit. The only impedance was that of the milliammeter, which was negligible. Actually in practice we have some impedance present in order to make use of the variations in the anode current, and this has led to the development of what is called a "dynamic" characteristic.

There are, however, an infinite number of such dynamic characteristics, one for each combination of valve and external impedance and for the present we need say no more about them, other than realising that the presence of an external impedance does alter the characteristic considerably. The extent of the variation is quite easily

worked out mathematically, but we can gauge the principal effects of the altered conditions without resorting to mathematics.

### Effect of Anode Circuit

In the simple case with no external impedance, the whole of the varying voltage in the anode circuit is developed across the anode and filament. We know that in such case, the voltage in the anode circuit  $V_a$  is  $\mu$  times as great as the voltage applied across the grid and filament of the

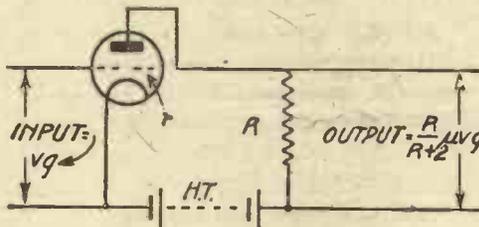


Diagram Explaining how the Output Voltage of a Valve is Calculated

valve, for a given value of anode current. This follows from the definition of amplification factor. In the practical case, on the other hand, the full voltage in the anode circuit is developed across the resistance of the valve in series with the external circuit. We cannot make use of the whole of this voltage, however, but only that which is developed across the external portion. Thus in the simple resistance-coupled circuit shown the proportion of the total voltage which we obtain externally is

$$\frac{R}{R+r}$$

this being the proportion of the external resistance to the total resistance. Therefore, by a simple modification of the previous expression, we are able to state that

$$\text{Anode voltage } V_a = \frac{R}{R+r} \mu V_g$$

This is a simple way of arriving at an expression which can be verified mathematically and, moreover, the expression applies even if we have inductances or tuned circuits in the anode circuit, pro-

vided we substitute the impedance of the circuit for the simple resistance  $R$ .

This expression shows us two things. In the first place, if we keep the amplification factor  $\mu$  constant, then the greater we make the external resistance (or impedance), relative to the internal resistance of the valve, the greater will be the resulting amplification, up to a limit equal to the amplification factor of the valve itself. This limit is reached if we make the external impedance infinitely large. There are obvious limitations to this increase, but nevertheless, the fact remains that in order to obtain efficient working from the valve, the external impedance must be large compared to that of the valve.

### How Mutual Conductance is Important

The second point is that for a given value of the anode resistance, the larger we can make the amplification factor of the valve, the better will be the results obtained. We have already seen, however, that the amplification factor is really deduced from the two primary factors of the valve, namely, the anode A.C. resistance and the mutual conductance. The three expressions are connected by the relation,

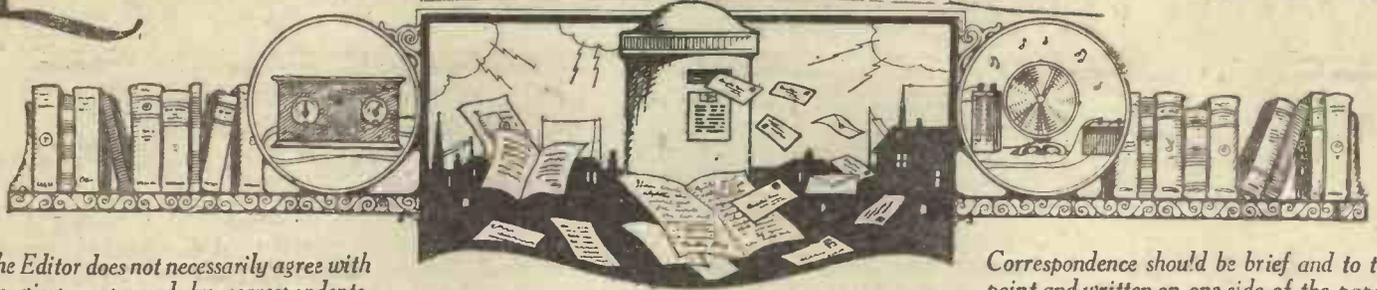
$$\text{Mutual conductance, } M = \frac{\mu}{r}$$

Consequently for a given value of A.C. anode resistance  $r$  we must increase  $M$  if we wish to increase  $\mu$ .

It is clearly impossible, therefore, to judge a valve entirely by its amplification factor, for a valve may have an amplification factor of 50 and yet be a worse valve in a particular circuit than one having an amplification factor of 25 only. This is rather an extreme case, but it is interesting to see how easily such a state of affairs could come about. Let us assume that the valve having an amplification factor of 25 has an A.C. anode resistance of 40,000 ohms, and that the external resistance in the anode circuit was 100,000 ohms. Then from the expression already deduced, the

(Continued on page 112)

# LETTERS TO THE EDITOR



The Editor does not necessarily agree with the views expressed by correspondents.

Correspondence should be brief and to the point and written on one side of the paper.

### 5GB at 3,000 Miles

SIR,—With reference to an article by Captain Eckersley (December 10), he stated that he heard 5GB (Daventry Junior) 1,500 miles out at sea. Not bad; but we can beat it easily.

We have received 5GB at Heliopolis, Egypt, on a three-valve set (detector and two L.F.); using vario tuning and parallel condensers in aerial circuit, power valve in last stage (Triotron, 4-volt), the aerial on roof (wire netting), and earth an aero stay. At times it is possible to work a crude loud-speaker, comprised of a Brown phone and a cone made of ordinary paper.

A. J. D. (Heliopolis, Egypt).

### Drilling the Panel

SIR,—Re "Thermion's" trouble with mounting components by using paper templates for marking out, the following method may be of use or interest to him.

Gum or clip the template to the panel, prick through the centres of the holes with a scriber, remove template. With a pair of small dividers make circles round the marks of the scriber a shade larger than the hole it is required to drill. With a small drill mounted in a handle the centres can be started ready for drilling (this is better than centre-punching). When the drilling is being done, the circles scribed round the centres form a good check on accuracy of position.

The above sounds a rather long method of setting out, but, assuming the template is accurate, will give absolute accuracy in drilling.—G. B. S. (West Ealing).

### Reception in South Africa

SIR,—On December 12, from 9.2 to 11.15 p.m., I heard London (? 5SW—Ed.) on 20.5 metres; reception was remarkably clear and pure, and at times fair loud-speaker strength. On December 19, from 9.45 to 11.28 p.m., London was again heard, but, owing to a strong south-easterly wind, the aerial swayed a bit, and reception was spoilt. On December 21, while searching round about 20 metres at 9.15 p.m., I picked up London, which was very clear and pure.

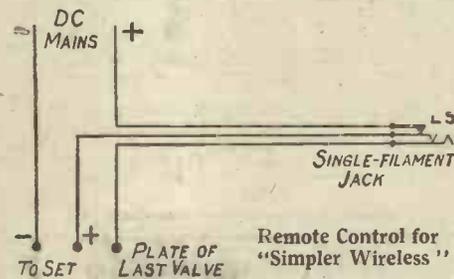
My receiver is a Reinartz o.V.2, described some time ago in

AMATEUR WIRELESS by "5YM." Aerial sloping to top of mast, about 25 feet long from set, and three wire counterpoise in room under set. The times given are South African standard time.

D. E. C. C. (Cape Town).

### "Simpler Wireless" Remote Control

SIR,—I am enclosing a diagram of the circuit I am using for remote control of the "Simpler Wireless" Special Three.

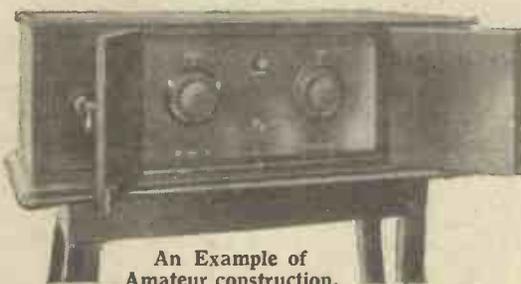


It will be seen that several plugs and jacks may be used in parallel, the set not being turned off until the last plug has been removed. Trusting this will prove interesting to builders of "Simpler Wireless" sets.

D. R. (Southend).

### Resistance Amplification

SIR,—As many constructors may possibly accept the circuit under the heading "Resistance Amplification" in No. 286 as the basis of a practical set, I should like to offer some suggestions of improvement. I made up a set on similar lines, using both single- and double-circuit crystal receivers coupled to the first amplifier by a fixed condenser and earthed with L.T.—, exactly as the circuit shown in No. 286. To obtain purity of reproduction, constancy in operation, and absolute certainty when adjusting the crystal rectifier—whether galena or semi-perman-



An Example of Amateur construction, "The Victory Three" made by an "A.W." reader

ent—the .1-microfarad condenser, coupling crystal to valve grid, should be replaced by one of .001 microfarad or smaller, otherwise an arc will be formed every time the crystal is adjusted; in fact, a correct setting can scarcely be found with anything larger than .001; adjustments are merely a series of crashes. The .25-megohm grid-leak may be dispensed with, for two reasons: (1) grid damping is already obtained via the crystal, even on the wrong side of the condenser; (2) the average crystal signal is too weak to require grid bias for stabilisation. The crystal sets tested could be heard easily on loud-speaker at three feet. Sufficient grid bias is already available across the filament from rheostat to resistor. I have not tried the principle of the 50,000-ohms resistance, but evidently its inclusion in that position would nullify the effect of reducing the coupling condenser, mentioned earlier, by allowing current to reach the crystal. The circuit may be reproduced as a practical receiver with these modifications.—W. B. (Stoke).

### A Curious Aerial Fault

SIR,—It may be of interest to some readers to learn of an aerial fault that gave me infinite trouble before it was solved. I found my set varied 40 degrees on the tuning condenser, from 20 to 60. Sometimes it would be quite normal, and perhaps the next time all wrong again; the trouble continued for about six months. The effect was as if the aerial were shortened. I have an extra aerial—a short one—for use on the short waves, and, happening to put this on at a time when the other was abnormal, I found I tuned in Daventry very nearly at the same degree on the condenser.

This led me to examine the long aerial, and I found that the down lead was turned over on the horizontal lead at a distance of 3 inches from the end of the horizontal section. The result was that only the down lead acted; but why it should be so I cannot tell. Since remedying this I have had no more trouble. The kink was sometimes absent, and then, of course, the aerial was normal; but after certain winds the wire kinked, and hence the puzzling variations that gave me no end of trouble.—W. J. F. (Redruth).

# BROADCASTERS IN PICTURE



**DE GROOT.**—One of the earliest of orchestra broadcasters, he has not been heard for over a year. He was last heard in a relay from the Palace Theatre during the showing of the film, "A Window in Piccadilly," in which he played a part.



**DORIS LEMON.**—One of the stars of the B.N.O.C., Miss Lemon has played in nearly every opera in their repertoire. She is always heard to best advantage in "Cavalleria Rusticana." In private life she is Mrs. William Michael.



**WILLIAM MICHAEL.**—Another member of the B.N.O.C., his chief roles have been in "Aida," "Romeo and Juliet," and as Marcel in "La Boheme." He commenced broadcasting with Miss Doris Lemon as far back as 1923.



**BILLY MAYERL.**—One of the original members of the first Savoy Orchestra, Mr. Mayerl is one of the best exponents of jazz on the piano. He is a Trinity College medalist.



**DORIS VANE.**—One of the earliest of broadcast artistes, Miss Vane was also one of the original "Follies" of Pelissier's company. Her speciality is light operatic work and coloratura singing.



**HERBERT LANGLEY.**—One of the best bass-baritones in the B.N.O.C., Mr. Langley's favourite roles are in "Othello" and Wagner's "Parsifal." He was specially chosen for the first performance of "Hugh the Drover" at Leeds.



**MARJORIE PARRY.**—This promising young soprano, a member of the B.N.O.C., hails from Bristol. Well known in oratorio work, she is also one of the best exponents of the English folk song.



**EDITH ROBINSON.**—Leader of her own quartet at Manchester, Miss Robinson is also well known as solo violinist at the city's leading concerts. She joins forces with three other well-known players, including Kathleen Moorhouse, the cellist.



**BEATRICE HARRISON.**—This world-famous cellist early lent her support to broadcasting. It will be remembered, too, that it was she who suggested and played for the nightingale broadcasts.

# "A.W." TESTS OF APPARATUS

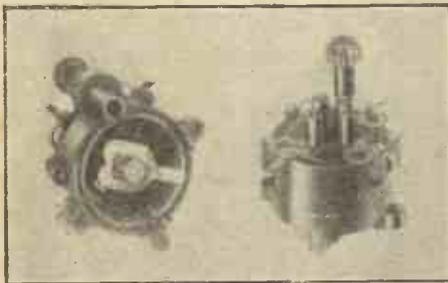
Conducted by our Technical Editor, J. H. REYNER, B.Sc. (Hons.), A.M.I.E.E.

## Harlie Valve-holder and Variable Resistance

WITH the introduction of fixed resistors, it has become the practice to utilise one such component to every valve, so that the filament circuit can be effectively controlled. The logical development of this arrangement is the inclusion of the resistance with the valve-holder and this has been carried into effect in a particularly neat manner by the Harlie Wireless Company Ltd., of Balham Road, Lower Edmonton, N.9.

The combined valve-holder and filament rheostat marketed by this firm carries an antiphonic valve-holder on the top of the moulding, while a filament rheostat of the usual rotary type is carried underneath the valve holder. Adjustment of the rheostat is obtained by means of a knob driving a vertical spindle which operates the contact arm on the rheostat through two gear wheels. The contact may be rotated by hand or by the aid of a screw-driver, for which purpose a slot is cut in the knob.

The whole of the rheostat and operating mechanism is enclosed within the moulding, the only criticism we have to make being the absence of any visible means whereby the position of the contact arm may be detected. On test the rheostat was found to have a maximum resistance of 28 ohms, and the component is thus suitable for



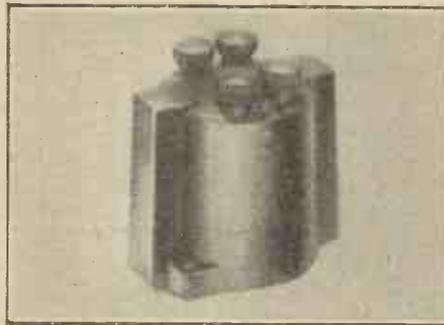
Harlie Combined Valve-holder and Resistance every modern valve. The unit is well-made and we can recommend it to readers.

## Brownie Popular Transformer

IT used to be considered that a good transformer was necessarily an expensive instrument and that with the so-called cheap type bad quality reproduction was inevitable. This fallacy has repeatedly been disproved since there are numbers of inexpensive transformers which will give quite satisfactory results if employed under proper conditions. It is the search for perfection which costs the money and where

a compromise will serve, cheaper products may be used.

The Brownie L.F. transformer being marketed by the Brownie Wireless Co. (G.B.) Ltd., Nelson Street Works, Mornington Crescent, N.W.1, although inexpensive demonstrated its ability to give good results in normal low-frequency amplifiers when



Brownie "Popular" Transformer

tested at our laboratories. The windings and iron core are completely enclosed in a moulded case which renders the component damp-proof. All terminals with the necessary lettering stamped beside them, are mounted on the top. A step-up ratio of 3.6 to 1 is obtained.

As a matter of interest, the transformer was compared with an expensive type having approximately the same step-up ratio: contrary to expectation, the volume appeared unaltered, while the tone was quite good, although the absence of the low audible frequencies could be detected. We can recommend this component where a good instrument is required at a low price.

## Ediswan Valves

SINCE the popularity of two-volt valves shows no signs of declining, valve manufacturers are specialising in this type and when one takes into consideration the low filament wattage, remarkably good results are certainly being obtained. We have received for test from the Edison Swan Electric Co. Ltd., of 123-5 Queen Victoria Street, E.C.2, three Ediswan two-volt valves. One of this series, the R.C.2 is designed specifically for use in resistance capacity-coupled stages. It has a high A.C. resistance between 100,000 and 150,000 ohms and a fairly high amplification factor. The second of the series is an H.F. valve with an A.C. resistance of 33,000 ohms and an amplification factor of 20. Used in standard H.F. circuits, the valve should give good amplification and selectivity.

The last of the series, the PV2 is a power valve. The characteristics obtained in our

laboratories show this valve is a good example of its type and should give excellent results in the final stage of an amplifier. The mutual conductance or figure of merit is particularly high, while the valve operates on a current of only .15 ampere. From the figures obtained in our laboratories and given below, it is evident that these valves are both economical and efficient.

Type	Fil. Volts	Fil. Current	H.T. Volts	Impedance	Ampl. Factor
RC2	2	0.1	90	104,000	25
RC2	2	0.1	70	150,000	33
H.F.210	2	0.1	90	33,000	19.8
PV2	2	0.15	90	6,800	6.8

## R.I. and Varley Multi-balancer

THE new R.I. & Varley super-transformer is now well known to readers. It will be remembered that this instrument carries three windings and, by suitable combinations of these, numerous arrangements of transformer and choke couplings can be obtained. In certain instances it is desirable to connect a condenser or leak across one or more of the windings, while in cases where choke coupling is employed a coupling condenser and suitable leak are required.

The R.I. & Varley multi-balancer is a compact assembly of the necessary condensers and leaks which will be found necessary in ordinary practice. The instru-

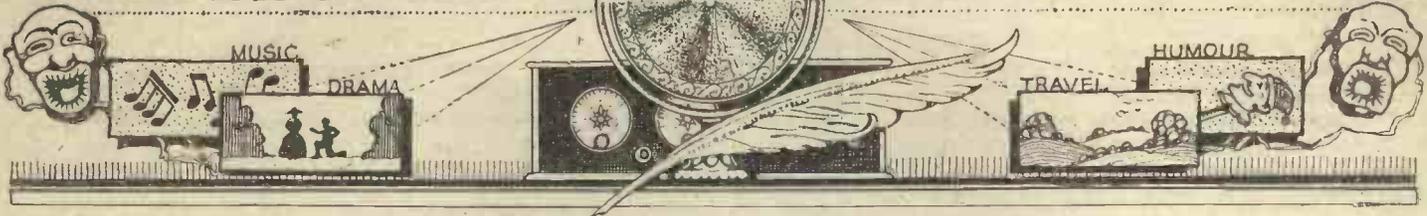


R.I. and Varley Multi-balancer

ment contains two fixed condensers and two leaks of different values, and also two three-way switches. These latter switches are for use if it is desired to arrange a rapid change of connections on the transformer.

Full details of the use of this component are given in the pamphlet accompanying the transformer, and as the price of the complete instrument is less than the sum of the individual components by a good margin, this device should find a ready sale among readers. R.I. & Varley, Ltd., of 103 Kingsway, W.C.2, are the makers.

# WITHOUT FEAR OR FAVOUR



*A Weekly Programme Criticism by Sydney A. Moseley*

**D**ID you hear the final talk on "Playwriting" by St. John Ervine? He was endeavouring to make the simple point, viz., that inconsistency in plays is sometimes permissible, and he went on to instance *Hamlet*. But instead of leaving this point as soon as he had made it, he went on developing the theme until it grew finally into a study of Shakespeare's plays—a favourite topic for the gifted critic. Quotation after quotation, argument after argument, in order to develop what was, after all, a small point in his theme. At that rate I thought he would require a couple of years in order to complete his lessons in playwriting.

Bravo, Wireless Clerk of the Weather! The forecasts recently have been correct to an almost uncanny degree. It used to be the fashion to gibe at the Weather Clerk. Through the intervention of wireless his good name has been restored to him.

Sir R. Witt, who spoke on "How to Enjoy Museums," a comparison with American methods, made a dull subject sound interesting—which is no mean achievement, as some of us know to our cost. Another talk on "Our Roads in Dick Turpin's Day," given by Mr. H. L. Beals, showed how talks should be given, although I do not suppose the subject itself was of wide interest. Mr. Beals is a lecturer at the London School of Economics, which, no doubt, accounts for his excellent elocution.

Another talk, of an entirely different character, was that of Mr. G. Tomkins, on "The Art of Water Divining." I seem to remember a talk by this interesting character before. Mr. Tomkins calls a spade a spade, and is a refreshing change from the usual run of highly cultured speakers.

Apropos my demand for clean transmissions, a reader states that he was shocked while listening to a certain pair of comedians to hear them commit more than one *double entendre*. I wonder if any other reader heard this; for, as it happened, I imagined that I, too, heard these "daring" attempts to be original, but did not make any comment in these columns in case I had misunderstood what was said.

I was speaking to one of the directors of a gramophone company the other day and,

referring to my recent suggestion that the gramophone companies should pay royalties to the B.B.C., he made an interesting revelation. "As soon as a record is broadcast," he told me, "there is an immediate rush to buy the record."

He instanced "In a Monastery Garden," which he said was "dead" two years ago.

The other day I was surprised to find a sudden rush for this record, and when I inquired why was met with the rejoinder: "Why, didn't you know it was broadcast the day before yesterday?"

I recently championed the Children's Hour from the rather frank criticism of the Director-General. But I felt inclined to take back all I said while listening to a Birmingham hour recently. It was a series of private chaffing with studied rudeness on the part of those in charge. The manners of those who took part were atrocious, and as an example to children of how *not* to behave it could not have been more calculated.

Unfortunately, listeners who object to such a display invariably switch off and take care not to be irritated again by giving these items a miss. Well, that is the easiest way out; but, unfortunately, it does not help to improve matters. I think sometimes it is our duty to listen to such stuff in order to indicate to the authorities what we think about them.

Mabel Constanduros' latest broadcast party was good, but somewhat noisy. She had too many "cooks" to help her spoil the festive broth this time.

What is happening to Stainless Stephen? Really funny fellows, we know, are at a premium. How is it, then, that the fun put over by Stainless is offered almost

exclusively to the provinces. Don't we need laughs? We have had him, too, when he has been S.B. to London and from the samples offered us then, I think we could tolerate him again.

If those who do me the honour of reading these notes will refer back to a suggestion which I made a little while ago, it will be found that I mentioned that the Carlton Hotel Orchestra deserved a hearing. I am not referring this time to the dance band, but to the octet directed by Renee Tapponnier. I was interested, therefore, to see that they recently made their appearance before the microphone and acquitted themselves with due credit. Yet, somehow, I have to admit that I missed the subdued atmosphere of the Carlton lounge, where I have heard them very often play to people who were more interested in their coffee than the excellent music that was provided.

Hush! Whisper it not in Savoy Hill! "The Londonderry Air" was given a holiday last week. But, instead, we had "Love's Old Sweet Song," which is, no doubt, going to deputise for a bit. The pity is that one tires of constant repetition of even the best of favourites. The way to preserve a good thing is to go without with discretion. This applies no less to artistes than to songs.



Miss Gleitze listening on a Burndept Ethiodyne (7-valve Super-heterodyne) whilst resting at Tangier. This receiver was taken on the launch which accompanied her on both attempts to swim the Straits of Gibraltar and provided music during the swim.



# WIRELESS SPECIAL FOUR

ALL FROM THE MAINS

JOHNSTON

One high-voltage fixed condenser .0003 mfd. (Dubilier, type 577).

Three fixed condensers, 2-mfd. each (Dubilier, type BD).

One condenser, 4-mfd. (Dubilier, type BD).

One 2-megohm grid leak and holder (Dubilier, Lissen).

Two terminals marked "Aerial" and "Earth" (Belling-Lee).

Connecting-up wire (Glazite, Junit).

A few words of explanation are necessary with regard to the above list. The three or four 400-ohm resistances may either be Igranic potentiometers with the contact-arms left disconnected or may be the Rooke Bro's. resistances which have been specially designed for use in "Simpler Wireless" sets.

The original sets were intended to be used on D.C. mains having a voltage of from 230 to 250. If it is intended to use the set on a D.C. supply with a voltage within these limits, or if it is intended to use it on an A.C. supply in conjunction with the special rectifier unit described in AMATEUR WIRE-

LESS No. 289, it should be built exactly as described. If, however, it is to be used on a 200-220 volt D.C. supply one of the 400-ohm resistances (that marked with a cross) should be omitted from the set.

As the set will often work as well without the usual earth connection as with it, and sometimes even better without the earth connection than with it, the earth terminal and the 2-mfd. condenser in series with it, may be omitted at first and added later if thought necessary; this is a matter for experiment.

## Special Requirements

It is advised that no departure be made from the design of the original set, either as regards the choice of components or layout. If another make of two-way coil-holder is used the whole layout may have to be altered. Special care should be taken to obtain the correct *types* of fixed condensers so that these may be well able to withstand the voltages applied across them.

The method of fixing the coil-holder into which the coil forming the primary of the H.F. transformer is to be plugged is clearly shown in the drawing. Care should be taken to mount this coil-holder with its pin and socket correctly disposed with regard to those of the two-way coil-holder.

Each of the L.F. chokes is provided with a tapping so that inductances of 40-, 60- or 100-henries may be obtained. In the tests of the original set it was found best to use the full 100-henries in each case, but readers can easily carry out experiments to see whether altering the connections to the

Wiring is Straightforward

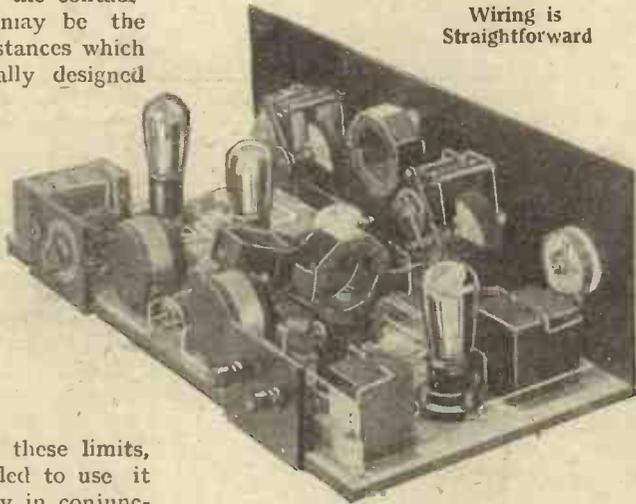
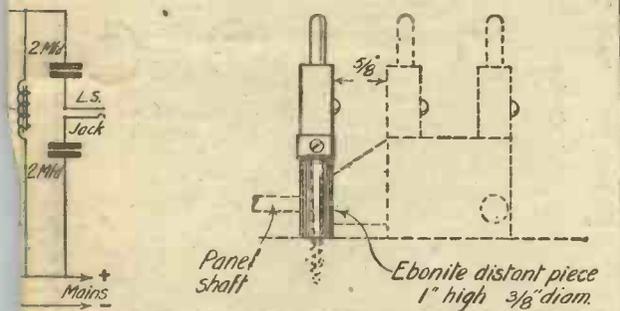


Diagram of the "Simpler Wireless" Special Four

Below.—Details of Coil Holders



One loud-speaker jack (Igranic, Lotus, Lissen).

One signal-lamp illuminator (Bulgin).

One .1 amp bulb (Bulgin).

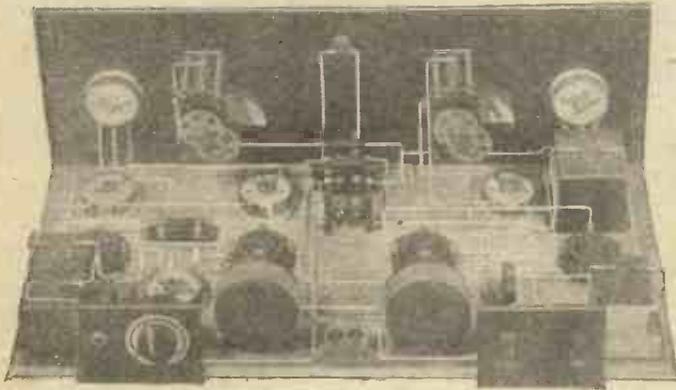
One safety-plug and fitting (Bulgin).

Two pieces of ebonite, each 4 in. by 3 in.

chokes improves results in their own particular cases.

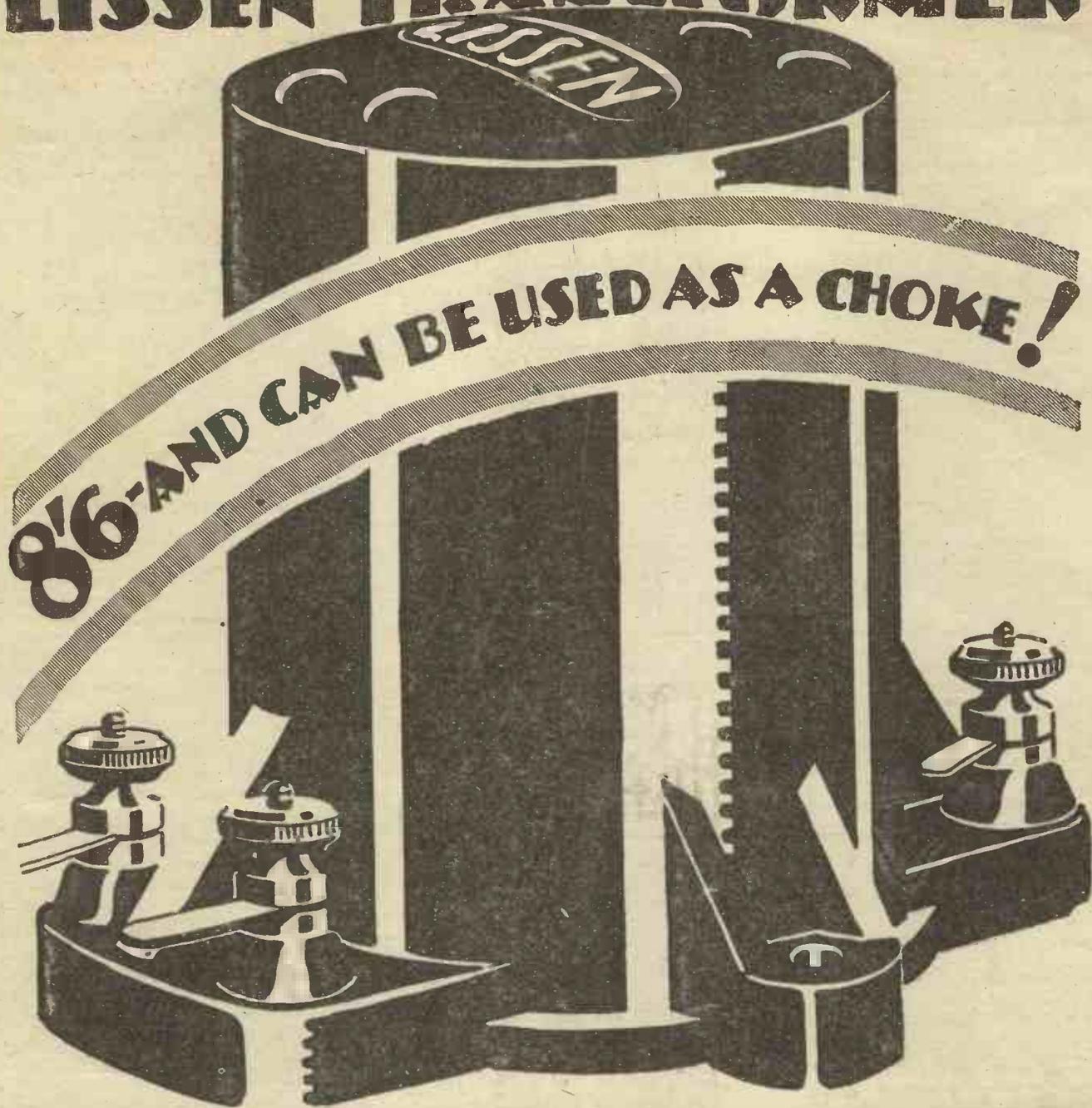
As in all "Simpler Wireless" sets the exact combination of valves used is of considerable importance. The first two valves should each be of the H.F. type with a moderately-high amplification factor, the third valve should be of the R.C. type and the last valve should be of the power, or super-power type.

It is, of course, essential that each of the valves used should have a filament current consumption of .1 amp., although the filament voltage required by each valve is quite immaterial. When the original set was being tested out the following valves of the Cossor .1 amp. range proved to be an excellent combination: 2-volt red-band as H.F. and detector, 2-volt blue-band in the third stage, and a Stentor Six (green-band 6-volt, .1 amp. valve) in the last position. The Cossor 2-volt red-band (H.F.) valve, in particular, has proved to be an excellent





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**B**ESIDES being the most efficient transformer on the market, the new LISSEN can be used with equal success as an L.F. Choke. You merely connect the O.P. and I.S. terminals together.

Acclaimed by tens of thousands as the finest amplifying transformer and preferred by LISSEN themselves (all the previously high-priced LISSEN transformers were withdrawn in its favour), it has only been possible to sell the new LISSEN for 8/6 because—

**FIRSTLY:** The immense facilities of LISSEN have been concentrated on the production of this one type.

**SECONDLY:** This transformer, like all LISSEN products, is sold direct to the retailer, and so wholesalers' profits are cut out.

**WE MAKE THIS OFFER.** If within 7 days of purchase you can find any transformer or choke—at any price—which you prefer to LISSEN, you can return the latter and your money will be refunded.

*Turns ratio 3 : 1. Resistance Ratio 4 : 1.*

Amplifies fully every note, every tone, every overtone, every harmonic. Guaranteed for 12 months.

*You can use 3 in cascade.*

**LISSEN LIMITED, 16-20, FRIARS LANE, RICHMOND, SURREY.**

*Managing Director:  
THOMAS N. COLE.*

L-251



**RULES.**—Please write distinctly and keep to the point. We reply promptly by post. Please give all necessary details. Ask one question at a time to ensure a prompt reply, and please put sketches, layouts, diagrams, etc., on separate sheets containing your name and address. See announcement below.

**Moving Coil Loud-speaker.**

**Q.**—Concerning "Thermion's" remarks relating to moving-coil driven loud-speakers in "Amateur Wireless," No. 283, will you tell me in which issue of "Amateur Wireless" the latest constructional details of such a speaker appeared?—T. B. (Worcester).

**A.**—Full constructional details of a moving-coil type loud-speaker, tested by Mr. Reynier, were published in "Amateur Wireless," No. 278, a copy of which can be obtained from the publishers, 58-61 Fetter Lane, London, E.C.4, at a cost of 7d., post free.—L. C.

**Accumulator Charging.**

**Q.**—I wish to charge a 6-volt accumulator, having a charging rate of 3 amperes, from a 250-volt D.C. mains system and have in my possession a number of 32-candle power carbon-filament lamps. May I use these lamps, and also how many for my purpose?—F. C. (North Finchley).

**A.**—You should use six 32-candle-power carbon-filament lamps connected in parallel with each other and wired in series between the positive D.C. main and the positive terminal of your accumulator. The negative terminal of the accumulator should be connected to the negative D.C. main.—L. C.

**Daventry Coils for "Ether Searcher."**

**Q.**—Having built the "Ether Searcher Three" receiver, as described in "Amateur Wireless," No. 284, I am experiencing difficulty in determining suitable coils for the reception of Daventry senior. Apart from this, I get quite good results on the short wave B.B.C. stations, but have some trouble in getting a good reaction effect. Assistance on these points would be welcomed.—F. H. (Middlesex).

**A.**—Suitable coils for the reception of 5XX are a No. 200 coil for the aerial, with a No. 100 or 150 for reaction. If you experience poor reaction effects on the short wavelengths, then you might try increasing the size of the reaction coil to, say, a No. 75 coil. This, however, should not be necessary where a low-resistance aerial-earth system is employed.—L. A. C.

**L.F. Transformers.**

**Q.**—Why should L.F. transformers have different ratios—some high and some low? One would think that, in order to obtain maximum amplification, a high-ratio transformer would always be desirable.—P. L. (Brixton).

**A.**—If amplification were the only thing to be considered it might be as you say, but a reasonable amount of purity is also usually required. In order to preserve good quality of reproduction, the impedance of the transformer primary should be high when it is connected in the plate circuit of a high-impedance valve and low when the valve has a low impedance. The total amount of wire which can be put on a transformer is limited by practical considerations, and this wire must be divided between the primary and secondary windings. Therefore the only way in which the impedance of the primary winding can be increased is to decrease the number of turns on the secondary. The effect of increasing the

primary turns and decreasing the secondary turns is, of course, to lower the ratio. Therefore a high-ratio transformer is required, for best results, after a low-impedance valve and a

**When Asking Technical Queries**

**PLEASE write briefly and to the point**

A fee of one shilling (postal order or postage stamps) must accompany each question and also a stamped, addressed envelope and the coupon which will be found on the last page.

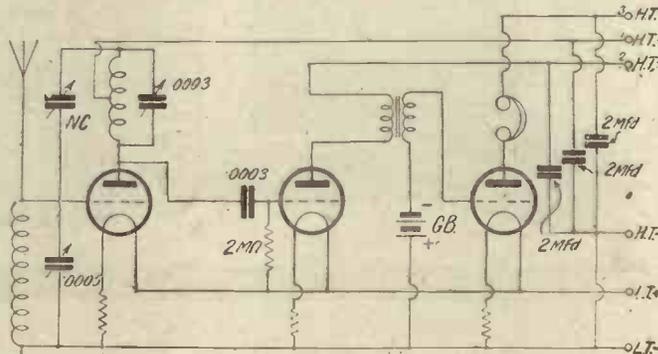
Rough sketches and circuit diagrams can be provided, but it will be necessary to charge a special fee (which will be quoted upon request) for detail layouts and designs.

low-ratio transformer after a high-impedance valve.—G. N.

**Three-valve Circuit.**

**Q.**—Will you please let me have a three-valve circuit consisting of H.F. stage, valve detector, and one L.F. stage? I want the first stage to be tuned-anode neutralised by a centre-tapped anode coil, and I want to use a transformer between the last two valves. I also want to use large condensors across the H.T.—G. D. L. (Byfleet).

**A.**—The circuit diagram for which you ask



**A Three-valve Circuit**

is given on this page. As you have not mentioned reaction, we have omitted it from the circuit. Provision is made for applying a separate H.T. voltage to each of the valves and for applying grid bias to the last valve. As three H.T. positive tapings are provided, three large-capacity condensers have been shown, each of which is connected between one of the H.T. positive tapings and H.T. negative.—G. N.

**Without Grid Leak.**

**Q.**—What is the matter with a set when it works better without the grid leak than with it?—P. T. (Bolton).

**A.**—If the grid leak is not faulty and is of

the correct value, the symptom you mention clearly indicates that there is an alternative path by which electrons reaching the grid of the valve may leak away. This path may be through the valve itself, if the vacuum of the latter is "soft," or, if the valve is hard, through leaky insulation somewhere between grid and filament.—N. F.

**Construction of H.T. Generator.**

**Q.**—I have a magneto which I wish to convert into an H.T. generator for a four-valve set, i.e., which will give me 150 volts, 25 milliamperes. The dimensions of the magneto are as follows: magnets, 6 in. high; armature tunnel, 2 3/4 in. diameter, 3 1/4 in. long. Will you give me necessary particulars for new armature required?—T. H. T. (Luton).

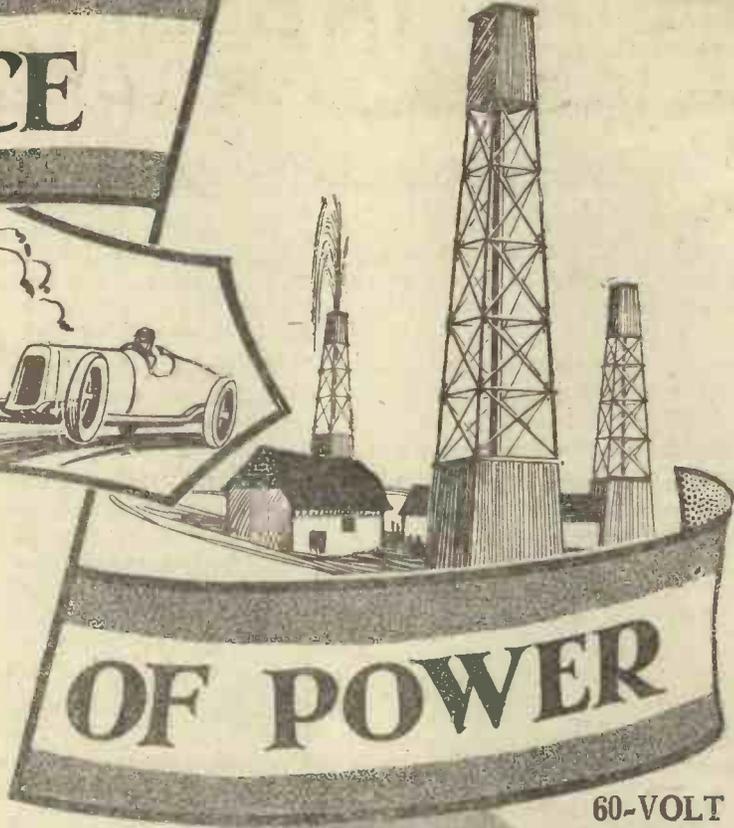
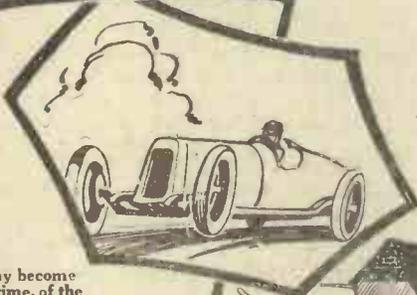
**A.**—The present end brackets will probably have to be replaced with others having a greater end extension in order to take the end windings and the commutator and brushes; also a new shaft will be necessary. The minimum length to allow for the end windings to project beyond the armature core is 1/2 in., and in addition to this another 3/8 in. should be allowed at one end for the over-all width of the high tension commutator. The dimensions of the commutator should be 1 1/4 in. diameter, 3/4 in. width of brush track, and 36 segments. The segments to be of hard-drawn copper, insulated with natural mica, .03 in. thick between segments, and with moulded micanite bush and coned end rings, .09 in. thick, firmly clamped upon a steel bush, with steel-coned end rings. The construction of the commutator is most important in high-tension generators, and the insulation must give "infinity" readings on a 500-volt megger test.

The armature core should be of Stalloy iron, .018 in. thick, insulated on one side, the outside diameter being such as to give an air gap of .025 in. all round between core and pole faces, and the shaft diameter through the core not less than 1/2 in. The core has 12 slots, of semi-enclosed pear shape, leaving parallel teeth 1/16 in. wide and 1/8 in. deep, the slot entrance being 3/32 in. wide. The insulation for the armature slots consists of one layer of 10-mil empire cloth, followed by one layer of 10 mil presspahn. Thirty-six armature coils are required, each consisting of 150 turns of No. 38 S.W.G. double silk-covered copper, grouped

three coils per slot. The coils are best former-wound (see "Dynamo Design and Construction" Handbook, by A. H. Avery), three coils being wound continuously on the former before cutting the wire, with loops taken out at the end of each coil, the group of three being taped up with 3-mil silk tape as one coil, to simplify assembly in the slots. Dry the armature thoroughly after completion, dope in Ohmaline varnish, and bake for four hours at 180° F. before putting it to work. Circular brushes, 5 millimetres diameter, of B/6 grade, will work well, in moulded insulating brush holders of the same kind as those used for the H.T. collector in the ordinary ignition-type magneto.—A. H. A.

# THE SOURCE

More modern than the petrol-driven engine—more convenient than mechanical contrivances working off the mains—lower in first cost, and more economical in every way—that's the Lissen New Process Battery. When converted energy from the mains is used new valves may come out with different characteristics from the old, or you may wish to



# OF POWER

change your valves, and your mechanical contrivances then may become useless. The Lissen Battery provides pure D.C. current all the time, of the correct voltage for any and every type of valve you may want to use now or in the future. No expensive moving parts to wear out and be replaced—no hum to eliminate, because the energy is chemically instead of mechanically generated. The Lissen Battery yields safe power, safe for children, safe for your valves, safe for everybody and everything. It brings a new power smoothness, and a new tone clarity to your loud-speaker which were never there before. It stands up to the longest programme; it lasts for months and months. You will find it, as tens of thousands of other users have already found it, the most economical source of power for your radio set, and all the time you use it you will get the finest reproduction you have ever had.

10,000 Radio Dealers Sell it. Ask for it in a way that shows that you will take no other.

- 60 volts (reads 66) 7/11
- 100 volts (reads 108) 12/11
- 9 volts (grid bias) 1/6

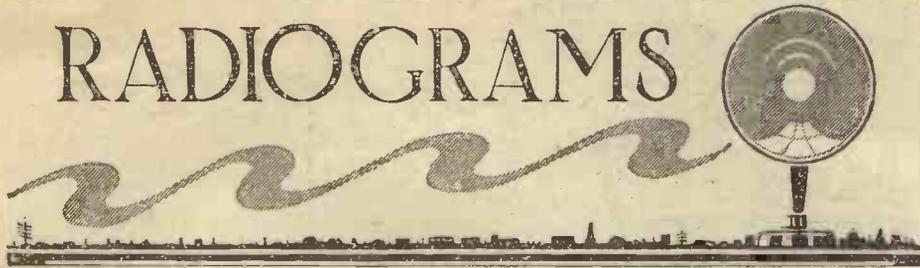
60-VOLT  
**7/11**



# LISSEN NEW PROCESS BATTERY

LISSEN LIMITED  
8-16, Friar's Lane, Richmond, Surrey  
Managing Director Thomas N. Cole

# RADIOGRAMS



A TRIBUTE to Sir Edward German will be paid by the Wireless Military Band on January 21, by a broadcast of a selection of his works from 2LO and 5XX.

A visit to Savoy Hill is to be paid on February 1 by the Lena Ashwell Players in order to broadcast scenes from *Macbeth*, with Miss Lena Ashwell in the title rôle.

A further programme of music by B.B.C. composers will be played by the Birmingham studio symphony orchestra, with Herbert Heyner as soloist, at 5GB on January 25.

John M. Synge's well-known comedy *A Playboy of the Western World*, is down for broadcast from 2LO and 5XX on January 19.

One of the earliest plays of Sir W. S. Gilbert, entitled *Sweethearts*, will be heard from the Birmingham studio on January 23.

Mrs. Burnett Smith, better known to thousands of readers as Annie S. Swan, will read one of her own short stories for broadcast from all Scottish stations on January 28.

On the occasion of its annual Burns night, the Burns Club, Newcastle, will have as guest on January 25, Sir John Samuel, who is so closely concerned with the civic life of the Scottish city that he is popularly known as "the Managing Director of Glasgow"! His speech will be relayed by the Newcastle station.

For its main programme on January 24 the Aberdeen station will broadcast an amusing show entitled *Chaos*. It has been worked out by the staff, who have endeavoured to imagine the terrible muddle which would arise if a complete novice were suddenly put in charge of the control room. There is plenty of room for a glorious mix-up!

The B.B.C. intends to give northern listeners the opportunity of hearing the work of the best-known composers and poets living in Scotland, as interpreted by themselves. Recitals of humorous vernacular verse of Colonel Rorie and W. D. Cocker are being arranged, together with recitals of songs by David Stephen, Michael Diack, and others.

The Chinese wireless station at Mukden has inaugurated a short-wave wireless service for Europe. Only messages addressed to Hamburg are accepted for the present.

The Marconi company has decided to establish a wireless service direct between England and Japan and other parts of the Orient. The new station at Dorchester will handle this traffic.

The opening ceremony of the Olympic Winter Sports at St. Moritz, Switzerland, will be relayed to the Berne and Zurich broadcasting stations.

In Russia wireless licences are granted to workmen's clubs on payment of a few pence monthly; on the other hand, restaurants, hotels, or places of amusement, according to their accommodation, must pay from 50 to 250 roubles per annum.

February 12, by arrangement with the Union Internationale de Radiophonie at Geneva, has been chosen for the broadcast of the next international programme; on this date the principal European transmitters will feature an all-Swedish entertainment.

Experiments recently made in the reception of broadcast programmes in the Hudson Tunnel connecting New York City with New Jersey, demonstrated that such reception was quite clear of atmospheric and other electrical disturbances experienced in these cities.

A new Marconi broadcasting station is under construction at Bratislava (Czechoslovakia); its power will be about 10 kilowatts. The site of the transmitter is Oberufer, some three miles from the city, in which a special studio is being built.

## "DO YOU KNOW?"

### Answers to Last Week's Questions

- (1) Cracow, Tromso and Porsgrund.
- (2) Cuba.
- (3) Manganese peroxide mixed with ground carbon or graphite.
- (4) A large H.F. coupler or transformer.

## Those Running Commentaries!



Drawn by E. Hingley.

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O 625	1 Cell	2	20	11	6	
O 626	2-volt	3	30	13	6	
O 627	2-volt	4	40	16	0	
O 632	2 Cells	2	20	1	2	6
O 633	4-volt	3	30	1	7	0
O 639	3 Cells	2	20	1	13	6
O 640	6-volt	3	30	2	0	6

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# The New Theory—The "Faraday Flux"

By H. DE A. DONISTHORPE

AFTER so many years of the existing theory relating to the propagation of electro-magnetic waves by that mysterious and elusive medium called by scientists "ether," it is almost incredible that we should be called upon to change our ideas. This change, however, seems to be in the "air," as such exponents of science as Professor Einstein of the famous relativity theory, and Professor Pupin of America suggest that things are not quite as we have been led to believe in the past.

What does this mean? It means the throwing overboard of our old stand-by—the Heaviside layer—which was responsible, so we thought, for all our long-distance radio work, and other theories about fading, etc.

Professor Einstein now informs us that the "ether" does not transmit our light waves, it follows *ipso facto* that this medium also cannot be responsible for the transmission of electro-magnetic waves. This bold assertion on the part of this great mathematician, if correct, must alter all our views on wireless work, and opens up a vast sphere of investigation for experiment.

Let us consider for a moment the suggestions put forward by Professor Pupin who calls his medium of electro-magnetic

wave propagation the "Faraday Flux." He visualises that individual electrons, with which we have become so familiar since thermionic valves became universal, transmit their own activity, through their own flux, or lines of force. In the transmission of wireless signals, we have a vast number of these energetic electrons moving in a regulated manner—we do know this definitely—and assuming Pupin's theory correct, they are transmitting their activity through their own flux.

Evidently, therefore, the Professor considers his "Faraday Flux" as permeating everything and being everywhere.

Such new conceptions cannot but give us fresh ideas about long-distance reception and that dreadful bugbear—fading.

### Short-wave Phenomena

The writer has personally been turning his attention to short waves, and there are undoubtedly phenomena associated with this work that do not altogether give confidence as to the old ideas of wave propagations.

Perhaps radio investigators are rather too inclined to get into a groove, for the science of radio is still a very young one and we must not consider it as a stereotyped

art like the electrical art, where progress is now more in detail than theory. The reader must consider when reading these notes the extraordinary march forward that radio has made in the past few years.

These notes are written with a hope that they may stimulate the amateur to further research.

In conclusion the following remarks made by an American judge in giving judgment in respect to a wireless case across the Atlantic confirms the author's last remarks as to further possible discoveries in the radio art. "Of course we shall not presume to say what radio really is, for no one has told us, and so far as we can learn from an independent study of text books on the subject, no one knows."

"PITMAN'S Radio Year Book for 1928" (Pitman, 1s. 6d.) is now on sale. The book contains well-illustrated articles which together cover broadcast transmission and reception, from both the technical and amusement sides, very comprehensively. The B.B.C.'s work during the year occupies, of course, a prominent place, while there are a number of interesting technical articles, together with useful reference tables.



# WIRELESS MAGAZINE

for February, will be on sale on JAN. 25th, 1/-

*Some of the special contents include:*

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**METROPOLITAN THREE.** Incorporates H.F. detector and L.F. Takes all current from D.C. Mains.

**EVERYDAY THREE.** Ideal for Loud-speaker reception of several stations from almost anywhere in the British Isles.

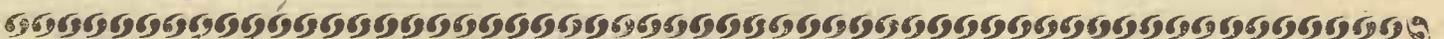
**ASTRAL FOUR.** Truly a star set. All batteries enclosed. No coil changing necessary. Purity with range. Two main tuning controls.

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Fil. Volts . . . . . 2	Fil. Volts . . . . . 2	Fil. Volts . . . . . 2
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Max H.T. Volts 150	Max H.T. Volts 120	Max H.T. Volts 120
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# VALVES

**NICKEL FILAMENT**

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## More Radiograms

ROUMANIA is soon to possess a 60-kilowatt broadcasting transmitter. For this purpose the *Societate de Radio Difuziune*, of Bucharest, has been constituted with the sanction of the Roumanian Government, which has declared itself willing to take up 60 per cent. of the capital of 50,000,000 lei, considered essential for the enterprise. In the meantime the small transmitter at Herestraeu, in the neighbourhood of Bucharest, has been brought into operation. Although a wavelength of 235 metres was allotted to this station, the Roumanians thought their transmissions should be effected on the higher band, and for some time on most evenings experiments have been carried out at 8 p.m. on a wavelength of 1,600 metres, and later in the neighbourhood of 2,000 metres.

Owing to the complete breakdown of French telegraph systems during the recent gales which swept the English Channel at Christmas, all messages destined to England were sent by wireless. Some 160,000 words were transmitted from Paris to London between December 27 and 29.

From January 1, weather reports have been broadcast on a wavelength of 1,100 metres from the Royal Dutch Meteorological Institute in Holland, at 11.5 a.m.,

12.15 p.m., and 8.20 p.m. G.M.T. The transmissions are effected in code in groups of four letters and are repeated in telephony. The key may be obtained free on written application to the Koninklijk Nederlandsch Meteorologisch Instituut at Te Bilt, Holland.

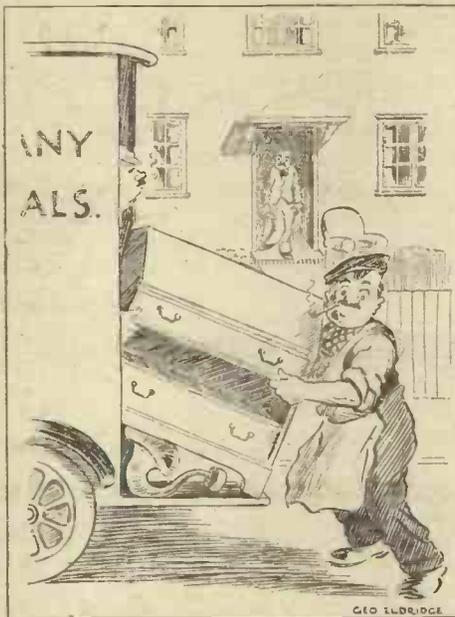
The new Polish broadcasting station at Wilno is now working daily on 435 metres

with a power of 1 kilowatt. On most evenings it takes the main Warsaw programme.

The Italian official broadcasting association, *Ente Italiano per le Audizioni Radiofoniche*, has pledged itself to erect transmitters at Genoa, Palermo, Trieste, and Turin during the present year, and to provide Rome with a 25-kilowatt transmitter. Hotels, clubs, kinemas, and other houses of amusement pay a special luxury tax for the use of broadcast receivers. A general tax on all towns and villages of over 1,000 inhabitants has also been levied, and in order to encourage listening amongst the population the broadcasting company will install one official receiver free at all local post offices for the use of the community.

During the past three years, more than seventy radio sets were in constant use in isolated construction camps along the route of the new £8,000,000 main line of railroad built between San Francisco and Portland Maine.

Ontario's wilderness has four radio transmitters. This summer an experiment was made by the Ontario Department of Lands and Forests. Four up-to-date short-wave transmitters were installed in northern Ontario to keep in touch with each other and give information to aeroplanes on forest patrol duty.



Overloading the Loud-speaker

# Transformer troubles banished by

# BROWNIE WIRELESS

Brownie Transformers are guaranteed 100% British. Made from the very finest materials, the characteristics and performance are equal to those of transformers costing twice the price. Ensure perfect tone and quality by building a Brownie Popular Transformer into your set. Examine this wonderful transformer for yourself at your nearest Radio Dealer.



THE BROWNIE POPULAR TRANSFORMER.—The magnetic field is composed of special laminations of the softest iron procurable, and the accuracy of the windings on their moulded bobbin guarantee distortionless reproduction, free from resonance. Totally enclosed in a moulded case .. ..

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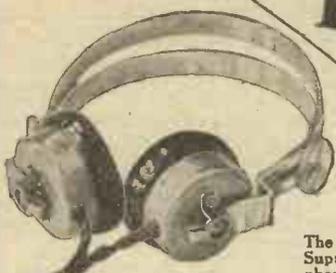
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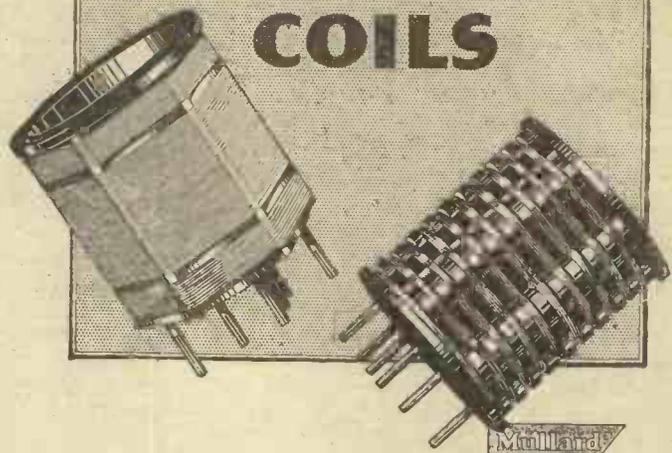
Adopted by the B.B.C. for use in their studios. Used by all the DX experimenters. Adopted as standard in 1909 by the Admiralty and in 1917 by the Air Board. Three resistances, 120, 2,000, and 4,000 ohms—only price, 12/6. Get your pair to-day!

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**COLVERN COILS**



**BUILD STRICTLY TO THE AUTHOR'S SPECIFICATION**

**The Mullard Master Three**

Colvern Accurate Space-wound Coils are specified by the Editor of *Radio for the Million*, for the Mullard Master Three, the Mullard Toreador P.M. and the Mullard Mikado P.M. Receivers because of their efficiency.

If you intend to build one of these receivers you should be very insistent with your dealer that it is your wish to adhere strictly to the published specifications.

Apart from the fact that by so doing you will be able to duplicate the published results, within a degree or two either way you will be able to locate stations with the assistance of the published dial readings.

Remember to use Colvern Accurate Space-wound Coils—these give the best results on both wave bands.

BROADCAST WAVE - - - 7/6  
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**HART BATTERIES**

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HOW GOOD ARE YOUR VALVES? (Continued from page 95)

effective amplification in the circuit would be

$$\frac{100,000}{100,000 + 40,000} \times 25 = 17.8.$$

The valve with the amplification factor of 50, however, might have an anode A.C. resistance of 200,000 ohms, in which case the effective amplification of the circuit would only be

$$\frac{100,000}{100,000 + 200,000} \times 50 = 16.6 \text{ only.}$$

**Not a Fallacy**

There would appear to be two fallacies in this argument. The first comment that one makes is, "Yes, but the value of the external resistance should have been increased in the latter case." This is quite a valid objection where we are dealing with resistance coupling. If, however, instead of a resistance, we have an impedance of some sort, such as a tuned circuit, it may be impossible to increase the value of this impedance so that the amplification over the whole stage would be definitely less in the second case than in the first case.

The second objection which might be raised is that the discrepancy between the anode A.C. resistance of the valve in the

two cases shown appears unusually high. This, however, is not the case. Valve design is certainly reaching a point where we are able to obtain amplification factors of the order of 50 with somewhat lower impedances than that quoted, yet at the same time there are valves on the market having even higher impedances for the same value of amplification factor. The difficulty is, that as the amplification factor is increased, so the grid has to be made closer and closer in mesh, and this exercises a rather heavy screening effect, with the result that the internal A.C. resistance rises very rapidly. It is, indeed, with a view to the reduction of this disproportionate rise that the four-electrode valve was evolved, for this enables amplification factors of the order of 50 to be obtained with an anode resistance of the order of 100,000 ohms only.

**Increasing the Mutual Conductance**

How are we to increase the mutual conductance of a valve and on what does it depend? The answer to the latter part of the question is that it is dependent simply and solely on the physical dimensions of the valve. The distance of the anode from the filament is one important factor, while the relative closeness of the anode and grid is

a further dimension which exercises considerable effect on the final results. A third and very important factor is the actual emission from the filament. It is not possible to go into the subject deeply in the present brief review, but it is by improvement in these various directions that better and better results are being obtained as the science of valve-making progresses.

It is an interesting point to note that the effective mutual conductance is very dependent upon the actual anode current. This is another way of saying that the higher we make the A.C. anode resistance, the less does the effective mutual conductance become. This is due to the fact that the anode current progressively decreases as we increase the resistance of the valve, largely owing to the screening effect of the grid previously referred to. The actual mesh of the grid wire has no effect upon the mutual conductance other than by the reduction of the anode current due to this effect.

**A Curious Fact**

This fact, when one first realises it, is apt to cause some astonishment. It means that the mutual conductance of two valves of the same class, such as a DEH and a (Concluded on page 114)

**SIMPLER WIRELESS!**  
To Builders of the SPECIAL FOUR

The Faradex Rectifier (Patent pending) "Simpler Wireless" Model specially designed by J. F. Johnston and described in A.W. No. 289, is the unit necessary to enable a "Simpler Wireless" Set to work from A.C. Mains. Price 30/-, plus 1/6 for packing and carriage.

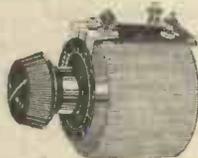
400-ohm potentiometer and resistances specially designed by J. F. Johnston for use in his sets. These must not be confused with the ordinary types of potentiometer.

They are guaranteed to carry the current and not to overheat.



400-ohm potentiometer, panel mounting, one hole fixing, 4/- (Post free, 4/3)

400-ohm resistance, base-board mounting, 2/6 (Post free, 2/9)



Faradex Rectifiers are also available for charging H.T. & L.T. Accumulators from A.C. Mains. Prices from 30/-. Full particulars on application to the sole manufacturers at the address below.

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Make your set the envy of all who see it by using Trolite for the panel. There are five different colours and designs of Trolite — you can choose the one that suits your cabinet best. In price, Trolite is more economical than any other panel—compare these prices:—

PRICES, per square inch:

Polished Black		Mahogany Walnut		Cube Wavy	
3/8 in.	3d.	3/8 in.	3d.	3/8 in.	3d.
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## "HOW GOOD ARE YOUR VALVES?"

(Continued from page 112)

DEP, are exactly equal if we could make the anode current the same. For example, a DEP610 valve has a mutual conductance, according to the makers' figures, of 1,550 micro-ohms ( $\mu=7$ ,  $r=4,500$ ), whereas a DEH610 has a mutual conductance of 615 micro-ohms only ( $\mu=40$ ,  $r=65,000$ ). Thus the value in the second case is less than half the former figure, due entirely to the screening effect of the closer mesh grid.

Yet the geometrical relationship of grid and anode is exactly the same in the two cases, and if we were to increase the high-tension voltage to a value of something like 600, so that the anode current of the DEH valve became of the same order as that of the DEP, we should find that the mutual conductances were then identical. Such a remedy is, of course, impracticable, but we can obtain a very similar effect by putting in a fourth electrode between the anode and the normal grid and connecting this to a source of steady positive potential, in which case we have the four-electrode valve.

We can conclude, therefore, by saying that with any given circuit, the mutual conductance is the factor which principally determines the results to be obtained. Secondly, that due to the screening effect of a close-mesh grid, the mutual conductance tends to fall off as the amplification

factor increases, so giving us a relatively higher anode A.C. resistance than we should otherwise obtain. Bearing these two points in mind, it is quite simple to obtain some gauge of the relative efficiency of any new valve, provided, of course, that they are suitable for comparison. To say, for example, that the DEP610 was twice as good as the DEH would be absurd, because of the enormous difference in their impedance, but provided this factor is taken into account, then the mutual conductance will give a rapid gauge of the capabilities of a particular valve.

Speeches will be broadcast on the occasion of the Burns Dinner in Cardiff on January 25, when Sir John Reith, Director-General of the B.B.C., will propose the toast of "The Immortal Memory." As the Mackintosh of Mackintosh and the Earl of Plymouth have promised to attend, the relay is well worth making a note of.

### RAYMOND COMPONENTS

On page 25 of No. 291 (January 7) there appeared an advertisement of K. Raymond of components for the Mullard "Master Three." The list given included one long-wave coil, and it should be noted that this was inserted in error. The inclusive price quoted, however, covers all the rest of the components, valves, batteries, etc., there specified.

The Eiffel Tower studio broadcasts, which are nightly carried out on 2,650 metres from 9 to 11 p.m., are now interrupted from 10.25 to 10.40 p.m. G.M.T. by the International Time Signals from the military station.

The Hilversum (Holland) station regularly broadcasts flood warnings of special interest to the province of Limburg, and to inhabitants living in the vicinity of the Maas, Scheldt, and Rhine rivers.

The Topsy Turvey Time Club of station WMAQ, Chicago, is said to be the world's largest radio club for boys and girls. It has nearly 250,000 members.

One of the largest harps in the United States is owned by Lester Krumm of Jo Bauer's orchestra, a dance band that plays for WOW, Omaha. The harp is valued at £500.

### "PIONEERS OF WIRELESS"

The method Mr. Elison Hawke has followed in his book *Pioneers of Wireless* (Methuen, 12s. 6d.) has been to trace the growth of electrical knowledge which has resulted in broadcasting by studies of the men who discovered this knowledge—the pioneers who "blazed the trail." The result is an extremely readable book packed full of biographical, historical, and technical information. Listeners who would like to know something of the romance that lies behind their receiver should read this book.



# A perfect connection at once!

Put a valve in a Lotus Valve Holder. Immediately the phosphor-bronze leg sockets expand and automatically lock. There is a perfect and permanent connection. The floating platform in which the valve is fixed is suspended by four phosphor-bronze springs—springs which have great mechanical strength, but are sufficiently resilient to absorb any external shocks liable to damage the valve.

Lotus Valve Holders are made from the finest bakelite mouldings obtainable. Every one is tested before it leaves the works.

#### REDUCED PRICES:—

Valve Holder without terminals ...	1/6
Valve Holder with terminals ...	1/9

Lotus Valve Holders are used and recommended in the Mullard circuits in "Radio for the Million" and are ideal for use in the "Master Three" and the "Cossor Melody Maker."

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Made by the makers of the famous Lotus Remote Controls, Lotus Vernier Coil Holder, and Lotus Jacks, Switches and Plugs.  
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Full-size Blueprints, each one being a photographic contact print, from the draughtsman's original design, and produced on stout paper, are now available of the following sets. Price.

No.	Post free.	s.	d.
<b>ONE-VALVE SETS</b>			
One-valver for Frame Aerial ...	W.M. 4	1	0
All-in-all One-valver ...	A.W. 13	1	0
Hartley DX One-valver ...	A.W. 27	1	0
Alpha One* ...	W.M. 26	2	3
Reinartz Plug-in One-valver ...	A.W. 46	1	0
The Dynalex (One-valver) ...	A.W. 69	1	0
Constant-coupled One ...	A.W. 65	1	0
Economy One ...	A.W. 71	1	0
<b>TWO-VALVE SETS</b>			
All Broadcast Two* ...	W.M. 5	2	3
Wide World Short-wave Two ...	A.W. 11	1	0
All-wave Two-valver ...	A.W. 15	1	0
Reinartz Two ...	A.W. 21	1	0
One-dial Two ...	W.M. 23	1	0
Empire Short-wave Two ...	A.W. 28	1	0
"Next-step" Receiver ...	A.W. 34	1	0
Girdle Two* ...	W.M. 30	1	3
Centre-tap Two ...	A.W. 42	1	0
Mains-fed Two ...	W.M. 37	1	0
Three-option Two ...	A.W. 51	1	0
The Rover Two ...	A.W. 53	1	0
British Broadcast Two ...	W.M. 44	1	0
General Purpose Two ...	A.W. 55	1	0
All-wave Two ...	A.W. 57	1	0
The "Yule" Two ...	A.W. 59	1	0
The 30/- Two-valver ...	A.W. 61	1	0
Economical Two ...	A.W. 66	1	0
<b>THREE-VALVE SETS</b>			
Continental Three ...	W.M. 7	1	0
Victory Three ...	A.W. 9	1	0
M.C.3 Star ...	A.W. 16	1	0
Wave-catcher Three ...	W.M. 19	1	0
Split-primary Three ...	A.W. 24	1	0
Purity Three-valver ...	A.W. 33	1	0
A Modern Tuned-anode Three ...	A.W. 35	1	0
Tetrode Three for Shielded Valves ...	A.W. 36	1	0
Alternative-programme Three ...	A.W. 38	1	0
A "Mains" Three-valver ...	W.M. 34	1	0
Screened-grid Three ...	W.M. 21	1	0
"Simpler Wireless" Special Three-valver ...	A.W. 44	1	0
"Home Station" Three ...	A.W. 45	1	0
The "Economy" Three ...	A.W. 48	1	0
Five-guinea Three ...	W.M. 29	1	0
Dominions Short-wave Three ...	W.M. 39	1	0
Short-wave Three ...	A.W. 50	1	0
The Ether Searcher Three ...	A.W. 52	1	0
Three Continent Three ...	A.W. 54	1	0
Tuned-anode Three for the Mains (D.C.) ...	W.M. 43	1	0
The Standard Three ...	A.W. 56	1	0
Straight-line Three ...	A.W. 60	1	0
Screened-grid Short-waver ...	W.M. 51	1	0
Hartley DX Three ...	A.W. 63	1	0
<b>THREE-FOUR-VALVE SETS</b>			
A Tuned-anode Three-four ...	A.W. 49	1	6
Concord Three-four ...	W.M. 45	1	6
<b>FOUR-VALVE SETS</b>			
M.C. Four ...	A.W. 8	1	6
Household Four ...	A.W. 17	1	6
Revelation Four ...	W.M. 24	1	6
"A.W." Gramo Radio ...	A.W. 40	1	6
All-purpose Four ...	A.W. 43	1	6
All-wave Roberts Four and copy of "A.W." ...	A.W. 47	0	7
C.T. Four ...	A.W. 58	1	6
Simplicity Four ...	W.M. 49	1	6
"Simpler Wireless" Four ...	A.W. 70	1	6
<b>FIVE-VALVE SETS</b>			
1927 Five ...	W.M. 6	1	6
Two-volter's Five ...	W.M. 11	1	6
Individual Five ...	A.W. 25	1	6
Exhibition Five ...	A.W. 33	1	6
Phoenix Five ...	W.M. 42	1	6
1928 Five ...	W.M. 46	1	6
<b>SIX-VALVE SETS</b>			
Nomad Six ...	W.M. 31	1	6
Short-wave Super-six ...	A.W. 67	1	6
<b>SEVEN-VALVE SETS</b>			
Simpladyne Seven (Super-hot.) ...	W.M. 22	1	6
<b>AMPLIFIERS</b>			
Two-valve D.C. Mains Amplifier ...	W.M. 16	1	0
Range Extender (H.F. Amplifying Unit) ...	W.M. 38	1	0
True-tone Amplifier ...	W.M. 47	1	0
Utility Two-valve Amplifier ...	A.W. 68	1	0
<b>PORTABLE SETS</b>			
Springtime Portable (Two-valver) ...	W.M. 12	1	0
Countryside Four ...	W.M. 17	1	6
Motorists' Portable Four-valver ...	A.W. 14	1	6
M.C. Three Portable ...	A.W. 22	1	0
Handy Three ...	W.M. 27	1	0
Holiday Portable (three-valver) ...	A.W. 32	1	0
Club Portable (three-valver) ...	A.W. 30	1	0
<b>CRYSTAL SETS</b>			
Crystal Set for the R.C. Enthusiast ...	W.M. 13	0	6
Hi-lo Crystal Set ...	W.M. 18	0	6
Two-programme Crystal Set ...	W.M. 25	0	6
Alternative-programme Crystal Set ...	A.W. 39	0	6
Half-Hour Crystal Set ...	W.M. 28	0	6
Centre-tap Crystal Set ...	W.M. 50	0	6
Super Crystal Receiver ...	A.W. 64	0	6
<b>MISCELLANEOUS</b>			
Loud-speaker Tone Control & Filter Unit* ...	W.M. 1	2	3
Heterodyne Wavemeter ...	A.W. 7	1	0
Made-to-measure Wave-trap ...	A.W. 19	0	6
New Current Supply Idea ...	A.W. 26	1	0
DX One-valve Unit ...	A.W. 37	1	0
Volume Control Unit ...	W.M. 40	0	6
Battery Eliminator for A.C. Mains ...	W.M. 41	1	0
"Simpler Wireless" Rectifying Unit ...	A.W. 62	1	0



In Radio, Benjamin have the honour of setting the standard for five types of components. They represent the culmination of many years' experimental work and the attainment of the highest degree of efficiency. They are classics.

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No other anti-microphonic valve-holder so efficiently disperses microphonic noises and absorbs shock so thoroughly as the Benjamin. Nearly 1,000,000 manufactured and sold to date. Price 2/6

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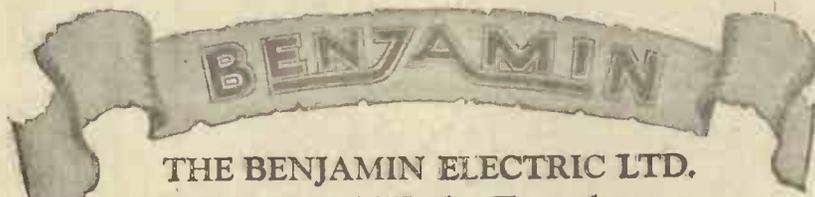
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## CHIEF EVENTS OF THE WEEK

- LONDON AND DAVENTRY (5XX)**
- Jan. 22 Service from St. Dominic's Priory. Chamber Music.
- " 24 Massenet programme.
- " 25 *Damon and Phillida* (John Gay).
- " 26 Hallé concert (from Manchester).
- " 27 National Concert relayed from the Queen's Hall.
- " 28 Running Commentary on fourth round of F.A. Cup.
- DAVENTRY (5GB)**
- Jan. 23 *Sweethearts*, a play by Sir W. S. Gilbert.
- " 24 Military Band Concert.
- " 25 Programme of music by B.B.C. composers.
- " 27 *A Museum Episode*, a farce by Stuart Ready.
- " 28 Operatic music and songs.
- CARDIFF**
- Jan. 23 *A Tale of Alsatia*; a picaresque by Vincent Thomas.
- " 26 Memories of Theatreland, 8: Adelphi Theatre.
- " 28 Seascapes and Stories.—1, a Captain Marryat programme, arranged by Harold Jenner and Gilbert Heron.
- MANCHESTER**
- Jan. 22 Organ recital and 'cello solos relayed from Manchester Cathedral.
- " 24 Two plays—*Triumph*, by Edward Farmer, and *The Blushing Hero*, a farce by Frank Tydesley.
- " 26 Hallé concert, relayed from the Free Trade Hall.
- " 28 Concert by the present students of Royal Manchester College of Music.
- GLASGOW**
- Jan. 25 Robert Burns programme.
- ABERDEEN**
- Jan. 24 *Chaos*, a novelty.
- BELFAST**
- Jan. 23 *Sea Silence*, a play by Edwin Lewis.

The Soviet authorities are erecting a super-power broadcast transmitter at Vladivostock, in order to broadcast political talks in the Russian, Chinese, and Japanese languages.

## THE RADIO DOCTOR

THE authorities of the Belgian Mercantile Marine are preparing a scheme for enabling the masters of vessels at sea to obtain medical advice by wireless in any emergency. Certain of the shore hospitals are to be fitted with suitable transmitting sets, and a special staff will "stand by" ready to give their help by wireless at any hour of the day or night. A definite band of wavelengths is to be allotted to this medical service, together with a specified priority signal, which will ensure any call for help being rapidly relayed from ship to ship until it reaches the proper quarter.

B. A. R.

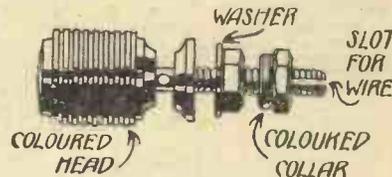
"Amateur Wireless and Electrics." Price Threepence. Published on Thursdays and bearing the date of Saturday immediately following. Post free to any part of the world: 3 months, 4s. 6d.; 6 months, 8s. 9d.; 12 months, 17s. 6d. Postal Orders, Post Office Orders, or Cheques should be made payable to "Bernard Jones Publications, Ltd."

General Correspondence is to be brief and written on one side of the paper only. All sketches and drawings to be on separate sheets. Contributions are always welcome, will be promptly considered, and if used will be paid for. Queries should be addressed to the Editor, and the conditions printed at the head of "Our Information Bureau" should be closely observed. Communications should be addressed, according to their nature, to The Editor, The Advertisement Manager, or the Publisher, "Amateur Wireless," 58-61 Fetter Lane, London, E.C.4.

## The Rainbow Terminal

THE Rainbow terminal, a new line just put on the market by Lectro Linx, Ltd., of 254 Vauxhall Bridge Road, S.W.1, is a well-made and inexpensive terminal which will find favour with the set constructor.

Its primary object is to eliminate any chances of making wrong connections. This



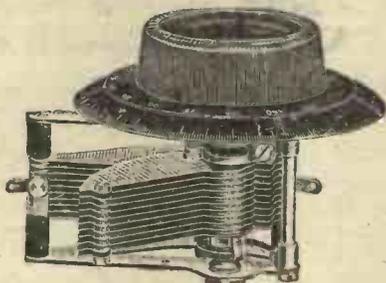
The Parts of the Rainbow Terminal

is ensured by having a collar on the lead to the terminal, the terminal head, and a ring below the panel, all of a distinctive colour. Thus, if once the leads are connected accurately to the batteries, the danger of "blown" valves and ruined batteries is reduced to a minimum.

The terminal and lead collar is supplied in nine colours. At the price of 5d. complete they are very good value. We have no hesitation in recommending them to readers.

André Charlot's third revue is due on January 21.

## WHY?



J.B., S.L.F.

**WHY**—when you open any Wireless journal to-day do you always find J.B. condensers used by the designers of the premier Receivers?

**WHY**—is the 1928 Solodyne Receiver equipped with a specially-designed J.B. condenser?

**WHY**—is "The Master Three" the simplest and most wonderful Receiver ever known to Radio, fitted with two J.B., S.L.F. Condensers?

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Prices, J.B., S.L.F., complete with 4-in. Bakelite Dial. .0005 mfd., 11/6; .0035 mfd., 10/6; .0025 mfd., 10/-.

For Short Wave Receivers, .00015 mfd., 10/-.

J.B., S.L.F. Slow Motion (J.B. True Tuning S.L.F.). Complete with 2-in. Bakelite knob for Slow Motion Device and 4-in. Bakelite Dial for coarse tuning. Double Reduction Friction Drive, Ratio 60-1. .0005 mfd., 16/6; .00035 mfd., 15/6; .00025 mfd., 15/-.

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1923 EDITION

192 PAGES

ENTIRELY REVISED

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FULL INSTRUCTIONS, with clear wiring diagrams, are given for making CRYSTAL AND SINGLE-VALVE SETS, ONE- AND TWO-VALVE AMPLIFIERS, THE FAMOUS SAXON FOUR-VALVE TUNED-ANODE SET, also an EXTREMELY EFFICIENT FIVE-VALVE RECEIVER.

Particular attention is drawn to our latest 1928 TWO- AND THREE-VALVE LOUD-SPEAKER SETS, which eliminate coils entirely and cover all wavelengths from 200 to 2,000 metres by merely turning a knob. Any beginner can make these sets in two or three hours.

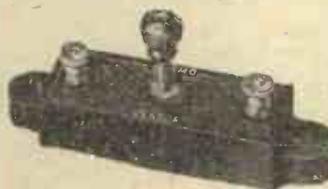
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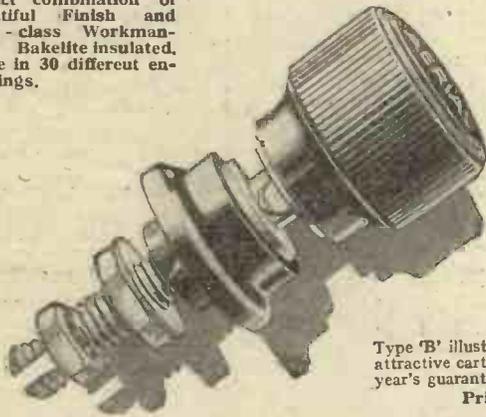
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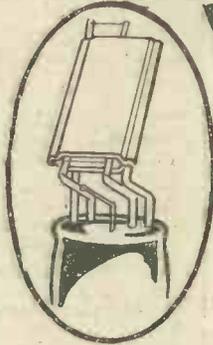
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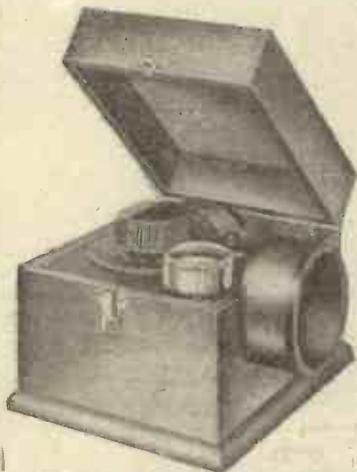
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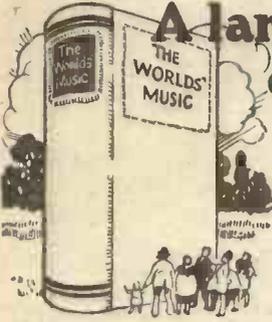
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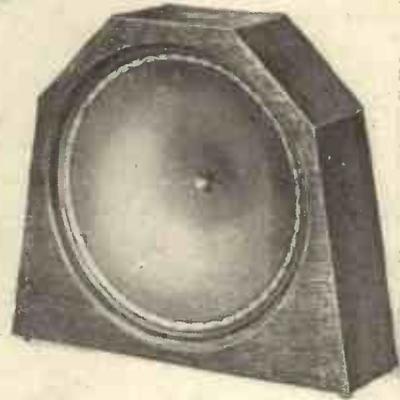
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